2013-1167
(Serial No. 10/378,261)

United States Court of Appeals for the Federal Circuit

IN RE RAYMOND GIANNELLI

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board.

JOINT APPENDIX

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RAYMOND GIANNELLI

Appeal 2010-007582
Application 10/378,261
Technology Center 3700

Before JOHN C. KERINS, EDWARD A. BROWN, and BENJAMIN D. M. WOOD, *Administrative Patent Judges.*

BROWN, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the rejection of claims 1-25. (App. Br. 2). We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

We AFFIRM.

THE CLAIMED SUBJECT MATTER

Independent claims 1, 15, and 23 are on appeal. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A row exercise machine comprising an input assembly including a first handle portion adapted to be moved from a first position to a second position by a pulling force exerted by a user on the first handle portion in a rowing motion, the input assembly defining a substantially linear path for the first handle portion from the first position to the second position.

THE REJECTION

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Giannelli (US 5,997,447; iss. Dec. 7, 1999).

ANALYSIS

Appellant argues claims 1 and 15 as a group, and does not provide separate argument for any one of dependent claims 2-14, 16-22, 24, and 25. (App. Br. 5-10; Reply Br. 2-3).[1] We select claim 1 as representative of the grouping, with claims 2-22, 24, and 25 standing or falling with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii)(2011).

The Examiner found Giannelli discloses that its device is used in a pushing motion, but found that the device is also capable of being pulled by the user. (Ans. 3).[2] The Examiner also found that a user is not limited to, or

[1] We herein refer to the Reply Brief dated May 27, 2008.
[2] We herein refer to the Examiner's Answer mailed May 2, 2008.

confined to, a seat when using Giannelli's device. (*Id.*). The Examiner further found that the claimed "substantially linear path" of the handle portion encompasses the slightly curvilinear (path) disclosed by Giannelli. (Ans. 4).

Appellant contends that the claims are directed to a row exercise machine that requires a pulling force (App. Br. 5-6), whereas Giannelli is directed to a chest press machine, and "[a] chest press exercise machine and motion is a different field of structure and exercise from a row machine." (App. Br. 7). Appellant further contends that Giannelli discloses that "the user *pushes* the handles through a *curvilinear path* from a chest to shoulder high rest position to a fully extended outward or forward position. This is *opposite* the presently claimed invention." (App. Br. 9).

Regarding Appellant's contention that Giannelli is not directed to a row exercise machine, the relevant issue is whether Giannelli's apparatus is capable of being used by exerting a pulling force on the handles in a rowing motion. Where the Patent and Trademark Office has reason to believe that a claimed functional limitation is an inherent characteristic of the prior art, the burden is shifted to Appellant to show that the prior art does not possess that characteristic. *See In re Best*, 562 F.2d 1252, 1254-55 (CCPA 1977) (quoting *In re Swinehart*, 439 F.2d 210, 212-13 (CCPA 1971)); *see also In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990) ("when the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.") In response to the Examiner's findings as to how Giannelli's apparatus is capable of being used, Appellant contends that Giannelli does not teach or suggest that "a user should stand on their feet and pull the arms," and that:

> The entire teaching of the Giannelli '447 disclosure is precisely the opposite of what the examiner contends that it is capable doing or how it is capable of being used. Even further, if a user were to stand on their feet and pull the handles, this would defeat the very purpose of the machine and the entire teaching of the disclosure.

(Reply Br. 2). These contentions are not persuasive.

Firstly, although Giannelli does not explicitly disclose the use of its structure as a row exercise machine, the absence of disclosure in Giannelli relating to this use or function is not dispositive. Rather, "[i]t is well settled that the recitation of a new intended use for an old product does not make a claim to that old product patentable." *See In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997) (citation omitted).

Secondly, Appellant has not provided any persuasive argument or evidence to show that Giannelli's apparatus is incapable of being used by exerting a pulling force on the handles in a rowing motion. In our view, it is reasonable to find that a user could face the handles 16a, 16b and support cushion 27 of Giannelli's apparatus and exert a pulling force on the handles 16a, 16b in a rowing motion, where the force is exerted in a direction that extends away from the support cushion 27 so as to move the handles 16a, 16b from a first position to a second position. (*See also* Giannelli, col. 4, l. 66 – col. 5, l. 10 and col. 5, ll. 46-50). Although such use may not fully achieve the "purpose" of Giannelli's apparatus, Appellant has not shown that the apparatus could not be used in such manner.

Appellant also contends that the Examiner's "comment that a linear path cannot be sufficiently distinguished from a curvilinear path does not take into account any of the distinct structures or functions of the claimed

apparatus." (App. Br. 9). As noted *supra*, however, the Examiner found that the claims recite a "*substantially* linear path" (emphasis added). Appellant has not provided any persuasive argument or evidence as to why the claimed "*substantially* linear path" (emphasis added) should be construed to not encompass Giannelli's "*slightly* curvilinear path" (emphasis added). The term "substantially" allows for the first handle portion to travel in a path that deviates from a perfectly linear path. In addition, claim 1 does not recite any limitation as to how far the first handle portion must move "from the first position to the second position." It is reasonable to find that as this distance decreases for movement of the handles in Giannelli's apparatus, the path would increasingly correspond to a linear path.

Appellant also contends that Giannelli is non-analogous prior art. (App. Br. 9; Reply Br. 5). The two *separate* tests for determining whether a reference is analogous prior art for purposes of a rejection under 35 U.S.C. § 103 are: (1) whether the reference is from the same field of endeavor, regardless of the problem addressed; and (2) *if* the reference is not within the inventor's field of endeavor, whether the reference is reasonably pertinent to the particular problem with which the inventor is involved. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). At the least, Appellant has not provided any persuasive argument as to why Giannelli does not meet test (1). The claimed invention is directed to the field of apparatuses for exercising the upper body. (Spec. para. [0003]). Giannelli is also directed to this same field of endeavor. (*See* Giannelli, col. 1, ll. 15-17). As such, we agree that Giannelli qualifies as analogous prior art.

In view of the above, we sustain the rejection of claim 1, as well as claims 2-22, 24, and 25.

Claim 23 is directed to a row exercise machine comprising, *inter alia*, a "user support structure mounted to the frame including a seat and a *chest pad*." (Emphasis added). The Examiner found Giannelli's support cushion 27 meets the claim limitation of a "chest pad." (Ans. 4). Appellant contends that "[t]he purpose of the chest [pad] is to oppose the *row-pulling motion* on the handles. No such component is present or even usable in the . . . Giannelli . . . apparatus." (App. Br. 7). This contention is not persuasive.

Claim 23 does not recite any structural limitation for the claimed "chest pad" that Giannelli's support cushion 27 lacks. In addition, the claim does not specify the location of the chest pad as opposing the row-pulling motion on the handles. Unclaimed features of the row exercise machine cannot be relied upon for patentability. *See In re Self*, 671 F.2d 1344, 1348 (Fed. Cir. 1982). As Appellant has not apprised us of any error in the Examiner's findings and conclusion, we sustain the rejection of claim 23.

DECISION

The Examiner's decision rejecting claims 1-25 is AFFIRMED.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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U.S. DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

January 16, 2013
(Date)

THIS IS TO CERTIFY that the annexed is a true copy of the Image File Wrapper (IFW) of the patent application identified below, said Contents being a list of the documents comprising the record in the United States Patent and Trademark Office in the matter of:

The Patent Application of:

Applicant: RAYMOND GIANNELLI

Serial No. : 10/378,261

File Date: March 3, 2003

Invention: ROWING MACHINE

By authority of the
DIRECTOR OF THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Marcia L. Fletcher

Certifying Officer

Prosecution History for Patent Application Serial Number 10/378,261

Date	History Text
03/03/2003	Specification, Drawings, Claims, Abstract, Declaration
03/03/2003	Information Disclosure Statement (IDS)
04/16/2003	Notice to File Missing Parts of Nonprovisional Application
04/29/2003	Response to Notice to File Missing Parts of Nonprovisional Application
11/03/2003	Power of Attorney
11/12/2003	Power of Attorney
10/04/2004	Status Inquiry
12/23/2004	Change of Address
10/12/2005	Non-Final Rejection
04/17/2006	Extension of Time
04/17/2006	Response to Non-Final Rejection
07/18/2006	Final Rejection
01/19/2007	Extension of Time
01/19/2007	Notice of Appeal
07/16/2007	Extension of Time
07/16/2007	Appeal Brief
02/05/2008	Examiner's Answer to Appeal Brief
03/31/2008	Request for Oral Hearing
03/31/2008	Reply Brief
05/02/2008	Examiner's Answer to Appeal Brief
05/27/2008	Reply Brief
07/30/2008	Reply Brief Noted – Patent Board
09/01/2009	Order Returning Undocketed Appeal to the Examiner from Patent Board
05/17/2010	Appeal Docketing Notice
05/21/2010	Notification of Appeal Hearing
06/04/2012	Confirmation of Hearing by Appellant
06/05/2012	Confirmation of Hearing by Appellant
10/29/2012	Patent Board Decision – Examiner Affirmed
12/07/2012	Appeal to CAFC

3-43

BOX PATENT APPLICATION
Commissioner of Patent
Washington, D.C. 20231

VIA EXPRESS MAIL NO.: EV019280435US
Date: March 03, 2003
Attorney Docket No.: 23555-92U

Sir:

Transmitted herewith for filing is the patent application of:

Inventor(s): Raymond Giannelli

Entitled: ROWING MACHINE

Enclosed are:

☒ Patent application (including 10 sheets of Specification; 6 sheets of Claims (Claims # 1-25); 1 sheet of Abstract; and 5 sheets of formal drawings (one set) (FIGS 1-5);

☒ Title Page for Patent Application;

☒ Declaration and Power of Attorney: ☐ executed ☒ unexecuted;

☒ Information Disclosure Statement w/Form PTO/SB/08A (Substitute for form PTO-1449) and copies of 17 cited reference(s);

☐ Assignment (w/Recordation Cover Sheet) of the invention to _____;

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☒ Postcard receipt

☐ Executed Request and Certification Under 35 U.S.C. 122(b)(2)(B)(i).

CLAIMS FILED: MINUS BASE:	EXTRA CLAIMS:	RATE:	BASIC FEE $ 750.00
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APPLICATION

FOR

UNITED STATES LETTERS PATENT

TITLE OF INVENTION

ROWING MACHINE

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Attorney Docket No.: 23555-92U

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is related to and claims priority to U.S. Provisional Patent Application Serial No. 60/361,622, filed March 04, 2002, entitled ROWING MACHINE, the entirety of which is incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] n/a

FIELD OF THE INVENTION

[0003] The present invention relates to the field of exercise and physical rehabilitation equipment, and in particular to an apparatus for exercising the upper body.

BACKGROUND OF THE INVENTION

[0004] It is often necessary or desirable for a person to exercise a particular muscle or group of muscles. For example, when a muscle is damaged, such as through injury or surgery, it is important to exercise the muscle to prevent atrophy and to strengthen the muscle for normal use. Further, people exercise healthy muscles to increase strength and to maintain an active and healthy lifestyle, as well as to improve their appearance. Various routines have been developed to exercise different muscle groups by forcing the muscles to contract and extend under a load, such as by moving a free weight against the force of gravity or by moving a handle whose movement is resisted by an exercise machine.

[0005] One such exercise is known as a row exercise, where the latisimus dorsi muscles are exercised. An exerciser lies prone on a bench, or bends at the waist, and grasps a barbell below him. The exerciser then pulls the barbell towards his torso and lowers it down. This exercise can be dangerous as the exerciser may drop the barbell. Additionally, as the arms are drawn towards

the torso, it is difficult to keep them low enough with respect to the trunk to involve the latisimus effectively. If the user pulls the bar towards the chest, the ability of the latisimus dorsi muscles to move the resistance decreases.

[0006] Furthermore, the exerciser should have a partner to spot him in case he fails to lift the weight. Even if done properly with a partner, this exercise may not permit the user a full range of exercise since the barbell may hit the user's chest before the back muscles have contracted fully. When using free weights, the resistance provided by gravity is constant while the strength of the muscles varies over the range of motion. Consequently, the muscles are not fully loaded at each point over the range.

[0007] To overcome these difficulties, machines have been developed that simulate the exercise movements of a row/rear deltoid exercise. In one apparatus, disclosed in U.S. Patent No. 5,620,402, a user exercises by pulling handles toward his torso. A seat and chest pad are mounted to a frame to position a user. Arms are rotatably mounted to the frame. The handles are mounted to the arms. The pivot for the arms is disposed above the seat. A cable operably connects the arms to a weight stack such that when a user pulls back on the handles, thereby rotating the arms, the weight stack is lifted and provides resistance to the exercise. The cable may be journaled over a variable radius cam to alter the distance the weight is displaced for a given amount of handle rotation at a particular point in the range of motion. Consequently, the resistance to the movement of the handles can be varied to match the strength curve of the back muscles. Unfortunately, the combination of row and rear deltoid exercise requires compromise for both patterns. The rear deltoid exercise is best performed in a transverse plane. The row exercise is best performed in the sagittal plane. Most row/rear deltoid machines do not have

enough vertical motion at the grip to allow for the full range of sagittal plane motion required to do the exercise correctly.

[0008] In another apparatus, disclosed in U.S. Pat. No. 5,135,456, a rowing machine is disclosed in which levers are rotatably mounted to a frame. Handles are mounted to the levers. Resistance to handle movement exercise is provided by weight plates mounted to the levers. The hinges for the levers are disposed at diverging angles with respect to a central vertical midplane, such that the user moves his hands in defined arcs in diverging planes as he pulls back on the handles. This apparatus forces the user's hands to be spread apart as the handles are drawn back toward the chest. The diverging motion is successful in greater engagement of the rear deltoid due to it's greater degree of transverse plane motion, but does not allow for enough vertical motion in the sagittal plane to do the row in a way that effectively engages the latisimus dorsi over the greatest range of motion.

[0009] It is object of this invention to provide an exercise machine which optimally isolates the latisimus muscle group to maximize muscular benefit during performance of a row movement.

SUMMARY OF THE INVENTION

[0010] The subject invention provides a rowing exercise machine with a substantially linear pattern of motion while offering a variable resistance throughout the range of motion of the muscles being trained. The exercise machine includes an input assembly which enables a user to maintain biomechanical alignment of the user's wrist and forearm during performance of the exercise, while maintaining a consistent resistance applied to the muscles, in the stability of an exercise machine. The input assembly is engagable by a user, where the input assembly defines a declining, substantially linear path as the input assembly is moved from a first position to a

second position. A user engages the input assembly in the first position, where the user's arms and forearms are substantially parallel to a horizontal plane define by the ground.

[0011] In an exemplary embodiment, the input assembly includes a pair of four-bar linkage mechanisms pivotally connected to the frame. The pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and a handle operatively associated with both the primary and secondary lever arms. The primary axes are disposed at an angle with respect to the frame such that the handles travel in diverging planes as the handles are drawn back.

[0012] Additionally, the handles are pivotally connected to both the primary lever arms and the secondary lever arms, so as to travel in declining, substantially linear paths as the handles are drawn back. The declining, substantially linear path enables the user to maintain the proper biomechanical alignment of the force angle being applied to the grip. This allows for a fairly consistent torque application at the shoulder thoughout the range of motion of the exercise. The use of the four bar linkage allows for an insignificant change in angle of the grip throughout the range even though the primary and secondary levers go through a significant change in angle during the same range of motion. This has the effect of allowing the user to maintain proper alignment of the wrist and forearm during performance of the exercise. "Proper" or "correct biomechanical positioning," as used herein, means that the force angle applied to the grip and the orientation of the user's wrist and forearm remains relatively constant from the start to finish of a row exercise motion, i.e., throughout a complete range of motion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] A more complete understanding of the present invention, and the attendant advantages and features thereof, will be more readily understood by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

[0014] FIG. 1 is a schematic representation of the exercise machine of the present invention;

[0015] FIG. 2 is a rear perspective view of the row exercise machine of the present invention;

[0016] FIG. 3 is a top view of the row exercise machine of the present invention;

[0017] FIG. 4 is a left side view of the row exercise machine of the present invention; and

[0018] FIG. 5 is a right side view of the row exercise machine of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] The subject invention provides a rowing exercise machine with a substantially linear range of motion while offering a consistent application of torque throughout the range of motion of the shoulder joint. The exercise machine includes an input assembly which enables a user to maintain biomechanical alignment of the user's wrist and forearm during performance of the exercise, while maintaining a consistent torque applied to the shoulder joint, in the stability of an exercise machine.

[0020] Referring to FIG. 1, the input assembly 2 defines a substantially linear path "P", wherein the input assembly 2 travels to the nadir of the substantially linear path "P" when the input assembly 2 is moved from a first position "F1" to a second position "F2." Similarly, the input assembly 2 travels to the apex of the substantially linear path "P" when the input assembly 2 is the moved from the second position "F2" to the first position "F1." The input assembly is

configured to keep the user's forearms substantially parallel to the ground as the input assembly travel along the substantially linear path "P."

[0021] In an exemplary embodiment, as shown in FIG. 2, the exercise machine 10 of the present invention includes a support frame 12 having a front leg 14, rear base 16, and a vertical support 18. A seat 20 is mounted to the front leg 14 of the support frame 12. The seat 20 is adapted to be positioned at various heights along the front leg 14 to provide a comfortable position for users of varying stature. A chest pad 22 is mounted on the front leg 14 above the seat 20 by a chest pad rod 24. In an exemplary embodiment, the front leg 14 angles away from the seat 20 in an upward direction where the chest pad 22 is disposed forward of the seat 20. The chest pad rod 24 may be of an adjustable length, such as by means of a telescoping rod held in position by a pin/detent connection 26. The adjustable-length chest pad rod 24 allows users of varying stature to be positioned at different distances from the machine, thereby permitting a full range of motion. Foot braces 28 are mounted to the bottom of the support frame 10 and are disposed in front of the seat 20. The foot braces 28, seat 20 and chest pad 22 comprise the user support adapted to maintain the user in a comfortable, stable position for exercising.

[0022] Referring to FIGS. 2 and 3, the input assembly includes four bar linkage mechanisms 30a and 30b pivotally mounted at the distal ends to an upper support frame 36. Four bar linkages 30a and 30b are symmetrical in construction, therefore, the below detailed description of linkage 30a is applicable to symmetrical linkage 30b as well. Four bar linkage 30a includes primary lever arm 32a, a secondary lever arm 34a, and a handle 38a. The primary lever arm 32a and secondary lever arm 34a lie and travel in a common plane which minimally diverges from a vertical midplane "A" as the primary lever 32a and the secondary lever 34a are drawn back in the direction of arrow "C", where vertical midplane "A" longitudinally bisects the seat 20. The

divergence of the common plane is sufficient to allow the handles 38a and 38b to pass on opposite sides of the user.

[0023] The primary lever arm 32a is an elongated bar which is pivotally connected at its proximal end to the handle 38a. The distal end of the primary lever arm 32a is pivotally connected to the upper support frame 36 by primary axle 42a disposed about primary axis 44a.

[0024] Secondary lever arm 34a is similarly an elongated bar which is pivotally connected at its proximal end to handle 38a, and is pivotally connected at its distal end to the upper support frame 38 by secondary axle 48a. The secondary axle 48a is axially disposed about secondary axis 50a. The primary axis 44a is disposed at an angle α with respect to a horizontal plane "B".

[0025] In an exemplary embodiment, the secondary axles 50a and 50b are spaced from and are parallel to the primary axles 44a and 44b.

[0026] As shown in FIG. 4, the handle 38a is the forward most component of the four bar linkage 30a. The handle 38a includes a first handle portion 52 and a second handle portion 54 curving upwardly from the first portion 52, at about, for example, a 120-degree angle. The relationship of the primary lever arm 32a with the secondary lever arm 34a is in an unequal length configuration. The unequal lengths force the handle 38a to tilt downwardly as the primary lever arm 32a moves from a first position to a second position. The effect this has is to cause grip 54 to mover in a substantially linear path defined as "P" even though the primary lever arm 32a is restricted to an arcuate path of motion. The angular displacement of the handle 38a, with respect to the ground plane, that is required to maintain a substantially linear path "P" is small in magnitude. The small angular displacement of the handle 38a helps maintains the grip 54 in a substantially vertical position. This enables the user to maintain the proper biomechanical alignment of the user's wrist and forearm during performance of the exercise. "Proper" or

"correct biomechanical positioning," as used herein, means that the orientation of the user's wrist and forearm remains relatively constant from the start to finish of a row exercise motion, i.e., throughout a complete range of motion.

[0027] Additionally, a stop plate 46 is mounted onto the vertical support 18, where the stop plate 46 engages secondary lever arm 34a when the exercise machine 10 is not in use. The stop plate 46 limits the rearward movement of four bar linkages 30a and 30b in the direction of arrow "E."

[0028] In an exemplary embodiment, as shown in FIG. 5, a weight stack frame 56 is attached to the support frame 12 by beams 58a and 58b, where the weight stack 60 is easily accessed by a user seated in seat 20. Connection bridges 62a and 62b (See also FIG. 4) are rigidly mounted to the front leg 14 and the weight stack frame 56, respectively. The bridges 62A and 62b support a transmission 64, including a shaft 66, a first cam 68 and a second cam 70. (See also FIG. 2) A weight stack pulley set 72a and 72b is mounted to the top of the weight stack frame 56, with pulley 72a aligned with the first cam 52 and pulley 72b aligned with the weight stack 60. Guide rods 74 are mounted vertically within the weight stack frame 56. The weight stack 60 is glidingly mounted to the guide rods 74 and provides a resistance to the exercise.

[0029] In alternative embodiments, other mechanisms for providing resistance, such as friction fitting, springs, elastic bands, hydraulic, pneumatic or electromagnetic resistance, or an air resistance fan could be employed (either alone or in combination) and still practice the invention. Additionally, free weights could be operable engaged to the four-bar linkage 30a and 30b to resist the movement.

[0030] In an embodiment, as shown in FIGS. 2-5, the handles 38a and 38b are operably connected to the weight stack 60 via the transmission system 64. A pair of frame pulleys 76 are

mounted to the vertical support 18 of the support frame 12. A lifting pulley 78 is operably connected to the handles 38a and 38b by a first cable 80, wherein the first cable 80 is threaded about and through the pair of frame pulleys 76, such that the lifting pulley 78 is positioned above the second cam 70. A lifting cable 82 connects the lifting pulley 78 to the second cam 70, where the second cam 70 is caused to rotate when at least one of the handles 38a or 38b is pulled back.

[0031] A belt 84 is attached at one end to the first cam 68, extending over the weight stack pulleys 72a and 72b and attached to the weight stack 60 at the opposite end. (See also FIG. 5). As the user pulls back on the handles 38a and 38b, the lifting pulley 78 is raised, causing the lifting cable 80 to unwind and rotate the second cam 70. As the second cam 70 rotates, the shaft 66 and the first cam 68 rotate as well. The rotation of the first cam 68 pulls the belt 84 over the weight stack pulleys 72a and 72b, and thus lifts the weight stack 60.

[0032] In an exemplary method of operation, a weight is selected on the main weight stack 60 by placing a pin (not shown) in one of the holes, as is known in the art. The user adjusts the seat 20 and chest pad 22 to a suitable position on the front leg 14. For example, a user with a longer torso will adjust the seat to a lower height such that the handles 38a and 38b are positioned at a comfortable height parallel with the users shoulders. The chest pad 22 is adjusted such that when the user grasps the handles tension is placed on the lifting cable 80. The user grasps the handles 38a and 38b and pulls back causing the lifting pulley 78 to be raised. As the lifting pulley 78 is raised, the first cam 70, shaft 66, and second cam 68 rotate, pulling on the belt 84 and lifting the selected weight. The user then returns the handles 38a and 38b to the initial position, thereby lowering the weight. When the user pulls the handles 38a and 38b back, the resistance provided by the weight is overcome. When the user returns the handles 38a and 38b, the user succumbs to the resistance provided by the weight.

[0033] It will be appreciated by persons skilled in the art that the present invention is not limited to what has been particularly shown and described herein above. In addition, unless mention was made above to the contrary, it should be noted that all of the accompanying drawings are not to scale. A variety of modifications and variations are possible in light of the above teachings without departing from the scope and spirit of the invention, which is limited only by the following claims.

What is claimed is:

1. A row exercise machine comprising an input assembly including a first handle portion adapted to be moved from a first position to a second position, the input assembly defining a substantially linear path for the first handle portion from the first position to the second position.

2. The exercise machine exercise machine according to claim 1, further comprising a second handle portion, wherein the first handle portion and the second handle portion travel in diverging planes as the first handle portion and the second handle portion are moved from the first position to the second position.

3. The exercise machine exercise machine according to claim 1, further comprising a second handle portion, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

4. The exercise machine exercise machine according to claim 1, further comprising a frame, wherein the input assembly is pivotally mounted to the frame.

5. The exercise machine exercise machine according to claim 4, wherein the input assembly is pivotally mounted to the frame forward and above a user.

6. The exercise machine exercise machine according to claim 1, further comprising a resistance mechanism operably connected to the input assembly.

7. The exercise machine exercise machine according to claim 1, wherein the first handle portion is substantially vertically oriented.

8. The exercise machine according to claim 1, wherein, the first handle portion travels to a nadir of the substantially linear path as the first handle portion is moved from the first position to the second position and the first handle portion travels to an apex of the substantially linear path as the first handle portion is moved from the second position to the first position.

9. The exercise machine according to claim 8, further comprising a second handle portion operatively connected to the input assemble, the second handle portion traveling to the nadir of the substantially linear path as the second handle portion is moved from the first position to the second position and the second handle portion traveling to the apex of the substantially linear path as the second handle portion is moved from the second position to the first position.

10. The exercise machine according to claim 9, wherein the first handle portion and the second handle are adapted to be grasped by a user, such that the forearms of a user remain substantially parallel to the ground as the first handle portion and the second handle are moved from the first position to the second position and the first handle portion and the second handle portion are moved from the second position to the first position.

11. The exercise machine according to claim 9, wherein the first handle portion and the second handle travel in diverging planes as the first handle portion and the second handle are moved from the first position to the second position.

12. The exercise machine according to claim 9, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

13. The exercise machine according to claim 9, wherein the input assembly comprises a pair of four-bar linkage mechanisms pivotally connected to the frame, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and the first handle portion and the second handle portion operatively associated with one each of the primary and secondary lever arms.

14. The exercise machine according to claim 1, further comprising a user support structure including:

a seat mounted to the frame; and

a chest pad mounted to the frame above and in front of the seat.

15. A row exercise machine comprising:

a frame;

an input assembly pivotably mounted to the frame forward and above of a user, the input assembly including a first handle portion and a second handle portion and defining a substantially linear path for the first handle portion and the second handle portion from a first position to a second position; and

a resistance mechanism operably connected to the input assembly.

16. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel to a nadir of the substantially linear path as the first handle portion and the second handle portion are moved from the first position to the second position and the first handle portion and the second handle portion travel to an apex of the substantially linear path as the first handle portion and the second handle portion are moved from the second position to the first position.

17. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel in diverging planes as the first handle portion and the second handle portion are moved from the first position to the second position.

18. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

19. The exercise machine exercise machine according to claim 15, wherein the first handle portion and the second handle portion are substantially vertically oriented.

20. The exercise machine according to claim15, wherein the first handle portion and the second handle portion are adapted to be grasped by a user, such that the user's forearms remain substantially parallel to the ground as the first handle portion and the second handle portion are moved.

21. The exercise machine according to claim 15, wherein the input assembly comprises a pair of four-bar linkage mechanisms pivotally connected to the frame, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and the first handle portion and the second handle portion operatively associated with one each of the primary and secondary lever arms.

22. The row exercise machine according to claim 15, further comprising a user support structure including:

a seat mounted to the frame; and

a chest pad mounted to the frame above and in front of the seat.

23. A row exercise machine comprising:

a frame;

user support structure mounted to the frame including a seat and a chest pad;

an input assembly pivotably mounted to the frame forward and above of the seat, the input assembly including a pair of four-bar linkage mechanisms each having a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis,

a pair of handle portions operably operatively associated with one each of the primary and secondary lever arms and defining a substantially linear path when moved from a first position to a second position, wherein the pair of handle portions travel to a nadir of the substantially linear path as the pair of handle portions are moved from the first position to the second position and the pair of handle portions travel to an apex of the substantially linear path as the pair of handle portions are moved from the second position to the first position; and

a resistance mechanism operably connected to the input assembly.

24. The exercise machine according to claim 22, wherein the pair of handle portions travel in diverging planes as the pair of handle portions are moved from the first position to the second position.

25. The exercise machine according to claim 22, wherein the pair of handle portions travel in converging planes as the pair of handle portions are moved from the second position to the first position.

ABSTRACT OF THE DISCLOSURE

A rowing exercise machine provides a declining, substantially linear path of motion while offering a consistent force angle at the grip. This allows for a fairly consistent torque application at the shoulder joint, throughout the range of motion of the exercise. The exercise machine includes an input assembly which enables a user to maintain biomechanical alignment of the user's wrist and forearm during performance of the exercise, while maintaining a consistent torque applied to the shoulder joint, in the stability of an exercise machine. The input assembly defines a declining, substantially linear path, where the user's forearms remain substantially parallel to the ground as the input assembly is drawn back.

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FIG. 1

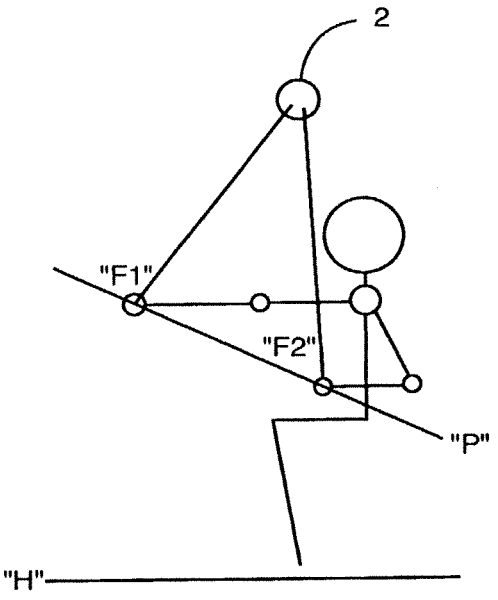

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FIG. 2

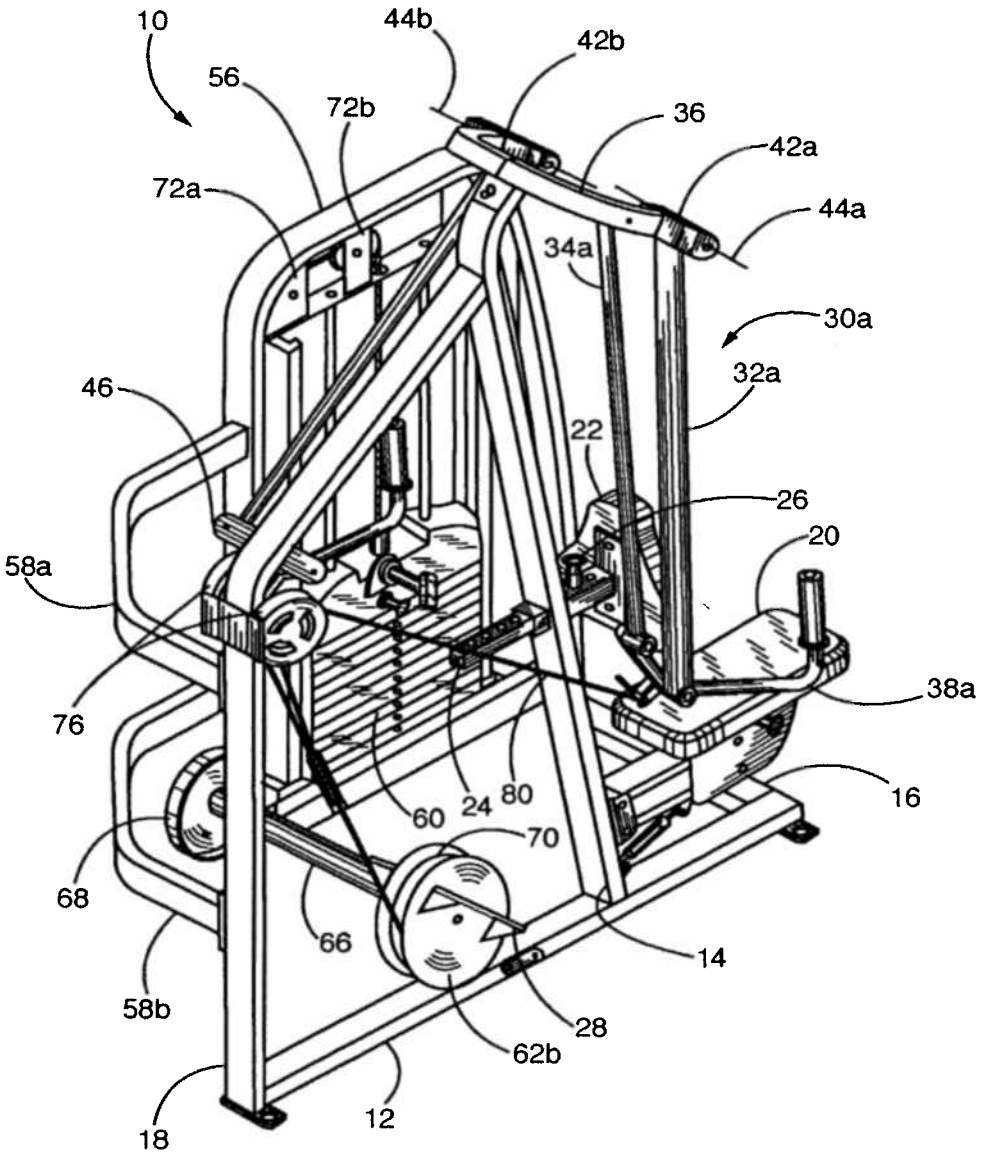
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FIG. 3

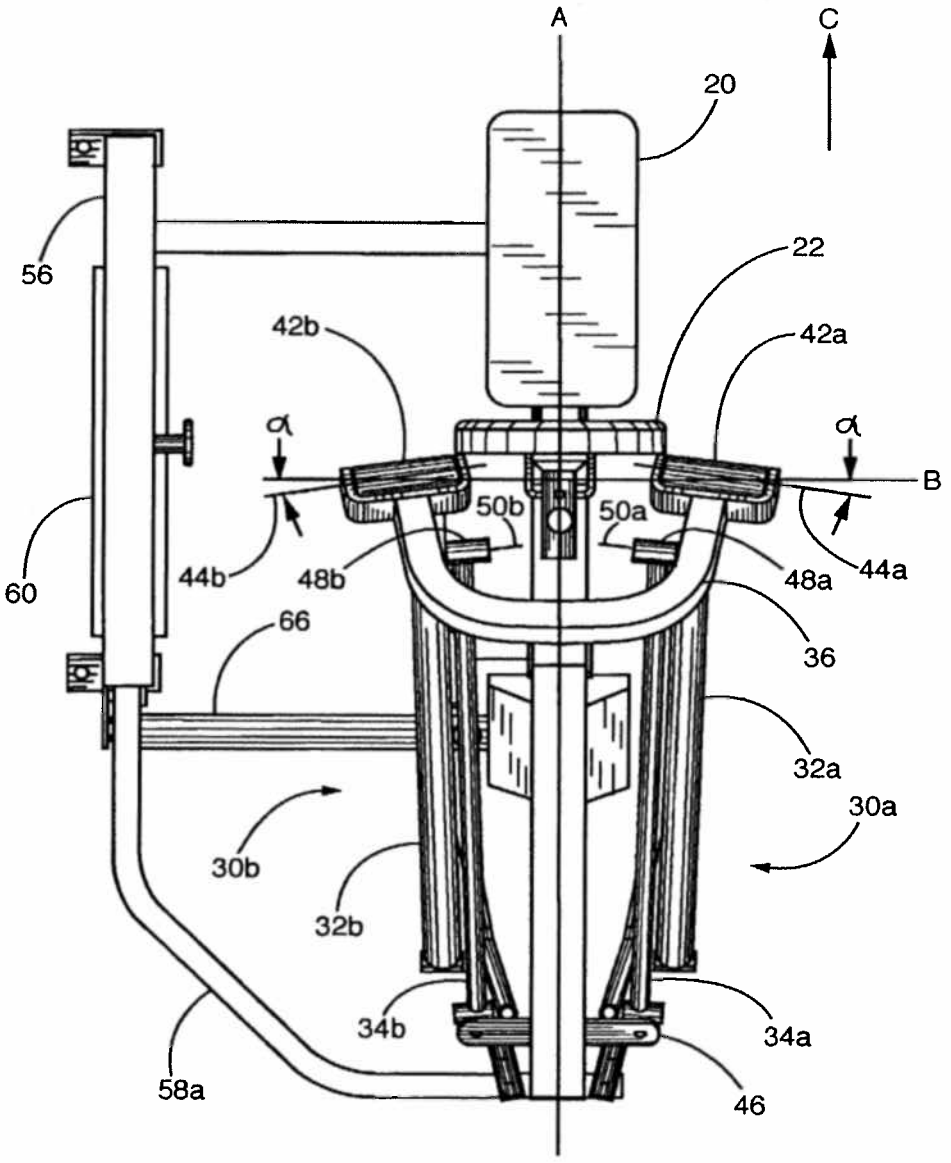
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FIG. 4

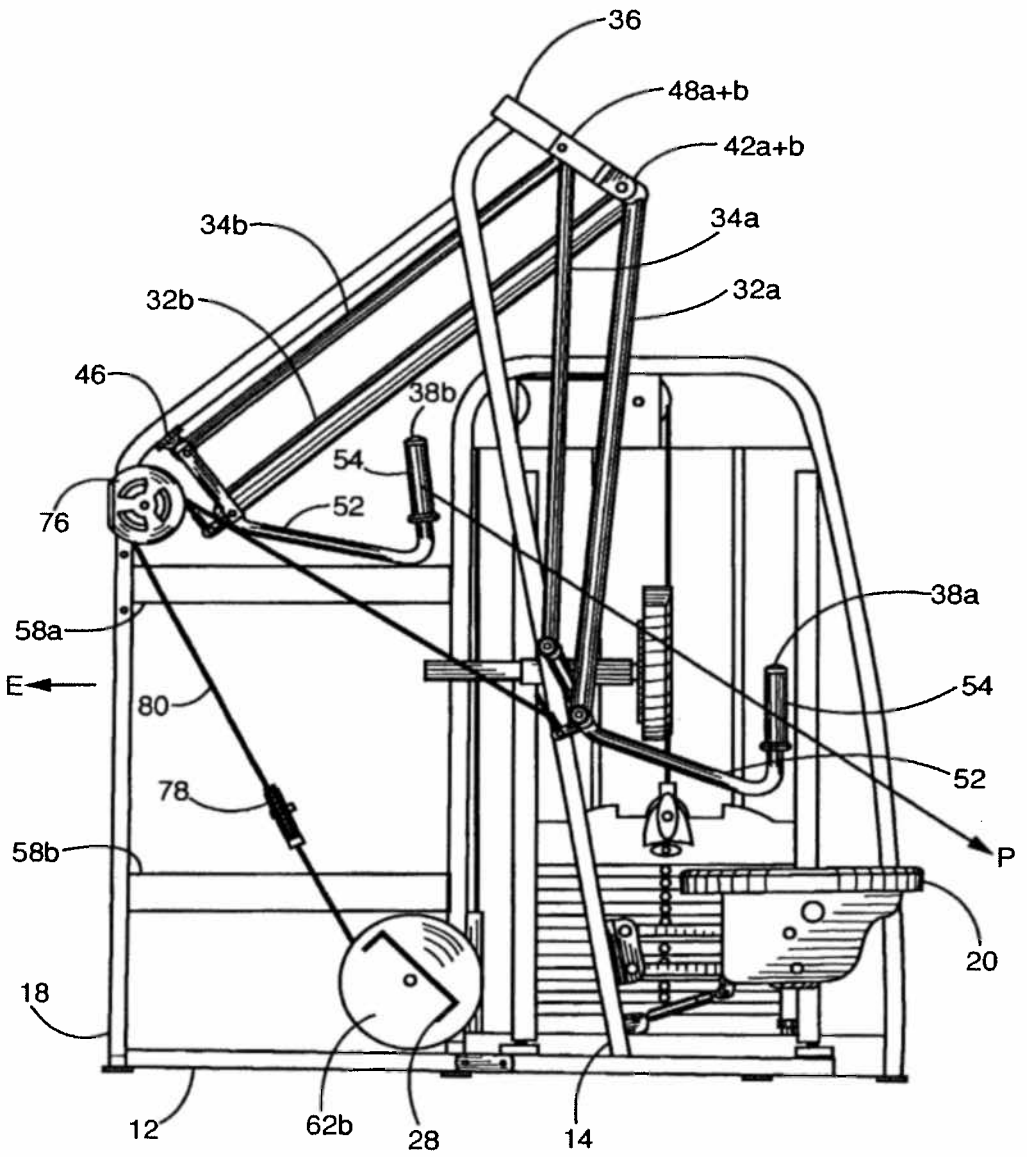
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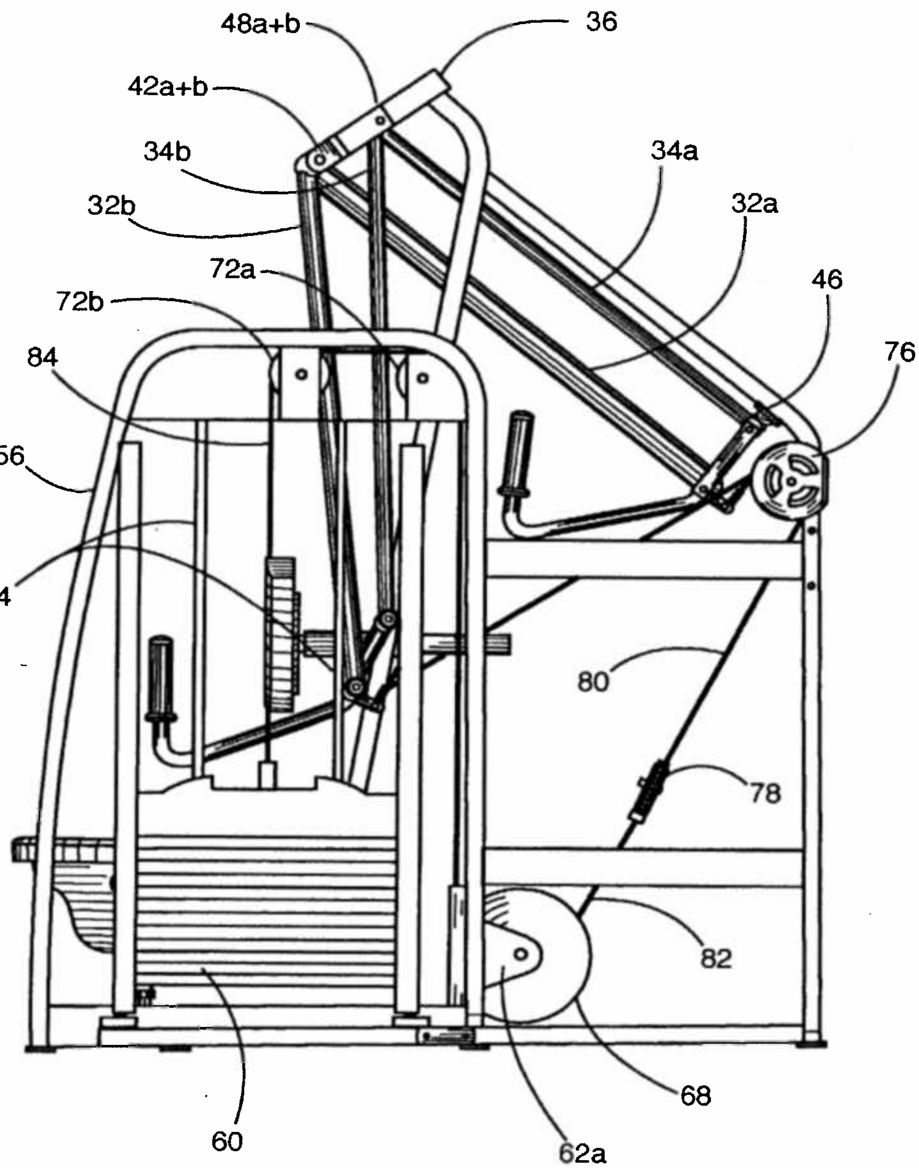
FIG. 5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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/378,261	03/03/2003	Raymond Giannelli	23555-92U	1700

21127 7590 10/12/2005

KUDIRKA & JOBSE, LLP
ONE STATE STREET
SUITE 800
BOSTON, MA 02109

EXAMINER	
DONNELLY, JEROME W	

ART UNIT	PAPER NUMBER
3764	

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/378,261	GIANNELLI, RAYMOND	
	Examiner	Art Unit	
	Jerome W. Donnelly	3764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-25 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

JEROME W. DONNELLY
PRIMARY EXAMINER

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3/3/03
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Giannelli et al (447).

Giannelli et al anticipates all of the claims of the application as broadly claimed.

Giannelli et al discloses a device including, 4-bar linkages, first and second handles, which travel in diverging planes as the first and second handle portion are moved from a first position to a second position, said first and second handle mounted to the frame forward and above, a user, a resistance mechanism, said handle being vertically oriented, a seat; and ,

Wherein a users forearms remain substantially parallel to a supporting surface as the handles are moved.

As to applicants claims of a chest pad, element (27) meets this language.

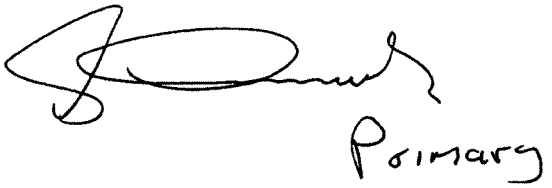
As to applicants claims of substantially linear. The abstract of Giannelli et al meet said language in the language of slightly curvilinear. Neither of these limitations meet the rigid limitation of 100% linear.

Applicants claims of forward in claim 1 is relative to the orientation of the user.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Note the overall device of Giannelli et al 6,254,516, Ellis, Giannelli et al 6,071,216 Ish, III and Randolph.

Any inquiry concerning this communication should be directed to Jerome Donnelly at telephone number (571) 272-4975.

Jerome Donnelly



PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	Not yet Assigned
Filing Date	Herewith
First Named Inventor	Raymond Giannelli
Art Unit	Not yet Assigned
Examiner Name	Not yet Assigned
Attorney Docket Number	23555-92U

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-5,135,449	08/04/1992	G.A. Jones	
		US-5,135,456	08/04/1992	G.A. Jones	
		US-5,273,505	12/28/1993	G.A. Jones	
		US-5,304,107	04/19/1994	A.A. Jones	
		US-5,437,589	08/01/1995	T.J. Habing	
		US-5,620,402	04/15/1997	R. Simonson	
		US-5,707,323	01/13/1998	R. Simonson	
		US-5,769,757	01/23/1998	K. Fulks	
		US-5,989,165	11/23/1999	R. Giannelli, et al.	
		US-5,971,896	10/26/1999	R. Giannelli, et al.	
		US-5,997,447	12/07/1999	R. Giannelli, et al.	
		US-6,056,678	05/02/2000	R. Giannelli, et al.	
		US-6,071,216	06/06/2000	R. Giannelli, et al.	
		US-6,142,917	11/07/2000	R. Giannelli, et al.	
		US-6,152,864	11/28/2000	R. Giannelli, et al.	
		US-6,203,474 B1	03/20/2001	G.A. Jones	
		US-6,254,516 B1	07/03/2001	R. Giannelli, et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	4-30-03

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

6613

Notice of References Cited	Application/Control No. 10/378,261	Applicant(s)/Patent Under Reexamination GIANNELLI, RAYMOND	
	Examiner Jerome W. Donnelly	Art Unit 3764	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
5	A	US-5,486,150	01-1996	Randolph, Lucian	482/133
	B	US-5,336,148	08-1994	Ish, III, Arthur B.	482/98
	C	US-6,071,216	06-2000	Giannelli et al.	482/100
	D	US-6,682,466	01-2004	Ellis, Patrick D.	482/142
	E	US-6,254,516	07-2001	Giannelli et al.	482/100
	F	US-5,997,447	12-1999	Giannelli et al.	482/100
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
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	P					
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	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
10/378,261	GIANNELLI, RAYMOND
Examiner	**Art Unit**
Jerome W. Donnelly	3764

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	+	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	
	1	9/ 3/05 √
	2	√
	3	√
	4	√
	5	√
	6	√
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Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination
10/378,261	GIANNELLI, RAYMOND
Examiner	**Art Unit**
Jerome W. Donnelly	3764

SEARCHED			
Class	Subclass	Date	Examiner
482	100	01/30/05	JWD
	136		
	72		
	73		
	97-101		
	130		
	142		

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR

AMENDMENT A	Docket No. C0016/7092

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
For:	ROWING MACHINE
Examiner:	Jerome Donnelly
Art Unit:	3764

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)
The undersigned hereby certifies that this document is being placed in the United States mail with first-class postage attached, addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the 12th day of April, 2006.

Beverly Strasnick

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the office communication dated October 12, 2005, please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A row exercise machine comprising an input assembly including a first handle portion adapted to be moved from a first position to a second position by a pulling force exerted by a user on the first handle portion in a rowing motion, the input assembly defining a substantially linear path for the first handle portion from the first position to the second position.

2. (Original) The exercise machine exercise machine according to claim 1, further comprising a second handle portion, wherein the first handle portion and the second handle portion travel in diverging planes as the first handle portion and the second handle portion are moved from the first position to the second position.

3. (Original) The exercise machine exercise machine according to claim 1, further comprising a second handle portion, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

4. (Original) The exercise machine exercise machine according to claim 1, further comprising a frame, wherein the input assembly is pivotally mounted to the frame.

5. (Original) The exercise machine exercise machine according to claim 4, wherein the input assembly is pivotally mounted to the frame forward and above a user.

6. (Original) The exercise machine exercise machine according to claim 1, further comprising a resistance mechanism operably connected to the input assembly.

7. (Original) The exercise machine exercise machine according to claim 1, wherein the first handle portion is substantially vertically oriented.

8. (Original) The exercise machine according to claim 1, wherein, the first handle portion travels to a nadir of the substantially linear path as the first handle portion is moved from the first position to the second position and the first handle portion travels to an apex of the substantially linear path as the first handle portion is moved from the second position to the first position.

9. (Original) The exercise machine according to claim 8, further comprising a second handle portion operatively connected to the input assemble, the second handle portion traveling to the nadir of the substantially linear path as the second handle portion is moved from the first position to the second position and the second handle portion traveling to the apex of the substantially linear path as the second handle portion is moved from the second position to the first position.

10. (Original) The exercise machine according to claim 9, wherein the first handle portion and the second handle are adapted to be grasped by a user, such that the forearms of a user remain substantially parallel to the ground as the first handle portion and the second handle are moved from the first position to the second position and the first handle portion and the second handle portion are moved from the second position to the first position.

11. (Original) The exercise machine according to claim 9, wherein the first handle portion and the second handle travel in diverging planes as the first handle portion and the second handle are moved from the first position to the second position.

12. (Original) The exercise machine according to claim 9, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

13. (Original) The exercise machine according to claim 9, wherein the input assembly comprises a pair of four-bar linkage mechanisms pivotally connected to the frame, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and the first handle portion and the second handle portion operatively associated with one each of the primary and secondary lever arms.

14. (Original) The exercise machine according to claim 1, further comprising a user support structure including: a seat mounted to the frame; and a chest pad mounted to the frame above and in front of the seat.

15. (Currently Amended) A row exercise machine comprising: a frame; an input assembly pivotably mounted to the frame forward and above of a user, the input assembly including a first handle portion and a second handle portion and defining a substantially linear path for the first handle portion and the second handle portion from a first position to a second position <u>by a pulling force exerted by a user on the first handle portion in a rowing motion</u>; and a resistance mechanism operably connected to the input assembly.

16. (Original) The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel to a nadir of the substantially linear path as the first handle portion and the second handle portion are moved from the first position to the second position and the first handle portion and the second handle portion travel to an apex of the substantially linear path as the first handle portion and the second handle portion are moved from the second position to the first position.

17. (Original) The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel in diverging planes as the first handle portion and the second handle portion are moved from the first position to the second position.

18. (Original) The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

19. (Original) The exercise machine exercise machine according to claim 15, wherein the first handle portion and the second handle portion are substantially vertically oriented.

20. (Original) The exercise machine according to claim 15, wherein the first handle portion and the second handle portion are adapted to be grasped by a user, such that the user's forearms remain substantially parallel to the ground as the first handle portion and the second handle portion are moved.

21. (Original) The exercise machine according to claim 15, wherein the input assembly comprises a pair of four-bar linkage mechanisms pivotally connected to the frame, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and the first handle portion and the second handle portion operatively associated with one each of the primary and secondary lever arms.

22. (Original) The row exercise machine according to claim 15, further comprising a user support structure including: a seat mounted to the frame; and a chest pad mounted to the frame above and in front of the seat.

23. (Original) A row exercise machine comprising: a frame; user support structure mounted to the frame including a seat and a chest pad; an input assembly pivotably mounted to the frame forward and above of the seat, the input assembly including a pair of four-bar linkage mechanisms each having a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, a pair of handle portions operably operatively associated with one each of the primary and secondary lever arms and defining a substantially linear path when moved from a first position to a second position, wherein the pair of handle portions travel to a nadir of the substantially linear path as the pair of handle portions are moved from the first position to the second position and the pair of handle portions travel to an apex of the substantially linear path as the pair of handle portions are moved from the second position to the first position; and a resistance mechanism operably connected to the input assembly.

24. (Original) The exercise machine according to claim 22, wherein the pair of handle portions travel in diverging planes as the pair of handle portions are moved from the first position to the second position.

25. (Original) The exercise machine according to claim 22, wherein the pair of handle portions travel in converging planes as the pair of handle portions are moved from the second position to the first position.

Remarks and Arguments

The Section 102 Rejection of Claims 1-25

The Examiner has rejected claims 1-25 as anticipated by the Giannelli '447 reference, U.S. Patent number 5,997,447.

Reconsideration of this rejection is respectfully requested.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Ex Parte Swope, 2004 Pat. App. LEXIS 30, (Bd.Pat.App. 2004).

The Giannelli '447 describes and discloses a chest press machine where a user pushes a pair of handles from a stationary start position outwardly under force of weight resistance. As repeatedly stated throughout the specification of the Giannelli '447 reference the path of the handles is not linear, it is curvilinear.

For at least these reasons the Giannelli '447 reference cannot be said to anticipate the presently claimed invention. As claimed, the present invention in the only two independent claims 1 and 15 (and thus in all remaining dependent claims) calls for the handle portion to travel in a linear path and to move from the start position via a pulling motion, not a pushing motion.

The Giannelli '447 reference does not anywhere disclose all of the elements of the claimed invention expressly or inherently. Rather, the Giannelli reference teaches the opposition of the claimed invention.

CONCLUSION

Reconsideration of the present application and early and favorable action is respectfully requested. If the examiner believes that a teleconference would expedite prosecution of the present application, the examiner is invited to call the Applicants' undersigned attorney at the Examiner's earliest convenience.

Any amendments or cancellation of claims made herein is made without prejudice and is not an admission that said canceled or amended subject matter is not patentable. Applicant reserves the right to pursue said canceled or amended subject matter in one or more continuation applications.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 02-3038.

Respectfully submitted

Date: April 12, 2006

M. Lawrence Oliverio, Esq. Reg. No. 30,915
KUDIRKA & JOBSE, LLP
Customer Number 021127
Tel: (617) 367-4600
Fax: (617) 367-4656

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/378,261	03/03/2003	Raymond Giannelli	23555-92U	1700

21127 7590 07/18/2006

KUDIRKA & JOBSE, LLP
ONE STATE STREET
SUITE 800
BOSTON, MA 02109

EXAMINER	
DONNELLY, JEROME W	

ART UNIT	PAPER NUMBER
3764	

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/378,261	GIANNELLI, RAYMOND	
	Examiner	Art Unit	
	Jerome W. Donnelly	3764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on 4/17/06

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-25 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

JEROME DONNELLY
PRIMARY EXAMINER

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Applicants remarks dated 4/17/06

Applicant arguments argue that the claims claim a his device as traveling in a "linear path". The claims however as originally present and as now amended claim a device which has handles which travel in a substantially linear path. Given applicants claims of substantially linear, it would lead one to believe that the applicant is trying to cover or present a claim limitation which will encompass a path of travel which is broader in scope that straight. Absent any clarification by the applicant the examiner the is of the opinion that if the path of applicants invention is not completely linear then it must encompass the disclosure of Giannelli (447) of being slightly curvilinear.

The examiner can not patentably distinguish between the disclosure of slightly curvilear and the claim language substantially linear.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giannelli.

Claims 1-25 are rejected for the same reasons as set forth in view Office Action 10/12/05

The examiner further, note that the handle members of Giannelli are capable of being pulled by the user of the device. The user is not limited to be confined to his seat.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication should be directed to Jerome Donnelly at telephone number (571) 272-4975.

Jerome Donnelly

JEROME DONNELLY
PRIMARY EXAMINER

Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination	
10/378,261	GIANNELLI, RAYMOND	
Examiner	**Art Unit**	
Jerome W. Donnelly	3764	

SEARCHED			
Class	Subclass	Date	Examiner
482	100	9/30/05	JWD
	136		
	72		
	73		
	97-101		
	130		
	142		
	6-25-06 updated		

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
10/378,261	GIANNELLI, RAYMOND
Examiner	**Art Unit**
Jerome W. Donnelly	3764

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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NOTICE OF APPEAL	Docket No. C0016/7092

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
Conf. No:	1700
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

The undersigned hereby certifies that this document is being placed in the United States mail with first-class postage attached, addressed to Mail Stop AF, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on January 16, 2007.

Judith M. Schultz

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant hereby appeals to the Board of Patent Appeals and Interferences from the decision of the examiner dated July 18, 2006, rejecting the following claims: 1-25.

Small Entity

☐ Applicant claims small entity status.
☐ Small Entity status is no longer claimed.

Extension of Time

☒ A petition for an extension of time for three month(s) under 37 C.F.R. §1.136(a) is enclosed.

Payment

☒ A check in the amount of $1,520.00 is enclosed.
☐ Charge Account No. 02-3038 in the amount of . A duplicate of this transmittal is attached.

01/19/2007 LWONDIM1 00000025 10378261
01 FC:1401 500.00 OP

☒ The Commissioner is hereby authorized to charge any additional fees incurred under 37 C.F.R. §1.16, §1.17 and §1.18 required by this paper and during the entire pendency of this application to Account No. 02-3038.

Respectfully submitted,

M. Lawrence Oliverio

Date: January 16, 2007

M. Lawrence Oliverio, Esq. Reg. No. 30,915
Rissman Jobse Hendricks & Oliverio, LLP
Customer Number 021127
Tel: (617) 367-4600 Fax: (617) 367-4656

PETITION FOR EXTENSION OF TIME UNDER 37 CFR §1.136(a)	Docket No. C0016/7092

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
Conf. No:	1700
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

The undersigned hereby certifies that this document is being placed in the United States mail with first-class postage attached, addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on January 16, 2007.

Judith M. Schultz

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This is a request under the provisions of 37 C.F.R. §1.136(a) to extend the period for filing a response in the above-identified application up to, and including, January 18, 2007.

Small Entity

☐ Applicant claims small entity status

Extension

The requested extension and the appropriate fee are as follows:

☐	One month (37 C.F.R. §1.17(a)(1))	
☐	Two months (37 C.F.R. §1.17(a)(2))	
☒	Three months (37 C.F.R. §1.17(a)(3))	1,020.00
☐	Four months (37 C.F.R. §1.17(a)(4))	
☐	Five months (37 C.F.R. §1.17(a)(5))	
	Reduction by one-half for request by small entity	
	Total Fee:	$1,020.00

Payment

☐ A check in the amount of the extension fee is enclosed.

☒ The extension fee is included in a fee payment made in connection with papers accompanying this petition.

01/19/2007 LWONDIM1 00000025 10378261

02 FC:1253 1020.00 OP

☐ Charge the extension fee to deposit account no. 02-3038. A duplicate of this sheet is attached.

☒ The Commissioner is hereby authorized to charge any other fees under 37 C.F.R. §1.16 and §1.17 that may be required, or credit any overpayment, to deposit account no. 02-3038.

M. Lawrence Oliverio Date: January 16, 2007

M. Lawrence Oliverio, Esq. Reg. No. 30,915
Rissman Jobse Hendricks & Oliverio, LLP
Customer Number 021127
Tel: (617) 367-4600 Fax: (617) 367-4656

AF

TRANSMITTAL LETTER	Docket No. C0016/7092

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
Conf. No:	1700
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Enclosures

- ☐ Affidavit under 37 C.F.R. 1.131
- ☐ Assignment Papers
- ☐ Change of Correspondence Address
- ☐ Declaration/Power of Attorney
- ☒ Extension of Time Request
- ☐ Fee Transmittal Form
- ☐ Invention Disclosure Document
- ☒ Notice of Appeal
- ☐ Petition for
- ☐ Power of Attorney Form
- ☐ Request for Certified Copies
- ☐ Request for Corrected Filing Receipt
- ☐ Copy of Original Filing Receipt
- ☐ Request for Continued Examination
- ☐ Request for Reconsideration
- ☐ Request for Refund
- ☐ Response to Missing Parts
- ☐ Return Receipt Postcard
- ☐ Sheets Formal Drawing(s)
- ☐ Status Letter
- ☐ Terminal Disclaimer
- ☒ Other: Check in the amount of $1,520.00

M. Lawrence Oliverio

Date: January 16, 2007

M. Lawrence Oliverio, Esq. Reg. No. 30,915
Rissman Jobse Hendricks & Oliverio, LLP
Customer Number 021127
Tel: (617) 367-4600 Fax: (617) 367-4656

PETITION FOR EXTENSION OF TIME UNDER 37 CFR §1.136(a)	Docket No. C016/7092US2

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764
Conf. No.:	1700

MS Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This is a request under the provisions of 37 C.F.R. §1.136(a) to extend the period for filing a response in the above-identified application up to, and including, July 16, 2007.

Small Entity

☐ Applicant claims small entity status

Extension

The requested extension and the appropriate fee are as follows:

☐	One month (37 C.F.R. §1.17(a)(1))	
☐	Two months (37 C.F.R. §1.17(a)(2))	
☐	Three months (37 C.F.R. §1.17(a)(3))	
☒	Four months (37 C.F.R. §1.17(a)(4))	1590.00
☐	Five months (37 C.F.R. §1.17(a)(5))	
	Reduction by one-half for request by small entity	
	Total Fee:	$1,590.00

Payment

☐ A check in the amount of the extension fee is enclosed.

☒ The extension fee is included in a fee payment made in connection with papers accompanying this petition.

☒ Charge the extension fee to deposit account no. 02-3038.
☒ The Commissioner is hereby authorized to charge any other fees under 37 C.F.R. §1.16 and §1.17 that may be required, or credit any overpayment, to deposit account no. 02-3038.

/M. Lawrence Oliverio/ Date: 2007-07-16

M. Lawrence Oliverio, Esq. Reg. No. 30,915
Rissman Jobse Hendricks & Oliverio, LLP
Customer Number 21127
Tel: (617) 367-4600 Fax: (617) 367-4656

APPELLANT'S BRIEF UNDER 37 CFR § 41.37	Docket No. C016/7092US2

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764
Conf. No.:	1700

MS Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This brief is submitted in response to the Final Office Action dated July 18, 2006 and in furtherance of the Notice of Appeal filed January 16, 2007.

The fees required under § 1.17(c), and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. 41.37(c)(1):

I REAL PARTY IN INTEREST (37 C.F.R. 41.37(c)(1)(i))

The real party in interest in this appeal is Cybex International, Inc.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. 41.37(c)(1)(ii))

There are no other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS (37 C.F.R. 41.37(c)(1)(iii))

Total Number of Claims in Application

Claims originally in the application are: 1-25.

Status of All Claims In Application

Claims still pending: 1-25

Claims canceled: none

Claims withdrawn from consideration, but not canceled: none

Claims allowed: none

Claims rejected: 1-25

Claims objected to: none

Claims on Appeal

The claims on appeal are: 1-25.

IV. STATUS OF AMENDMENTS (37 C.F.R. 41.37(c)(1)(iv))

All substantive amendments submitted by applicant have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. 41.31(c)(1)(v))

The claimed subject matter of the present application is perhaps best summarized by the independent claims. There are three (3) independent claims pending which read as follows.

References below to the specification and drawings are made with reference to the application as published by the United States Patent Office:

Claim 1. A row exercise machine comprising an input assembly (e.g. para. [0020], Fig. 1, element 2) including a first handle portion (e.g. para. [0026], Fig. 4, element 52) adapted to be moved from a first position to a second position (e.g. para [0020], Fig. 1) by a pulling force (e.g. Fig. 4, P) exerted by a user on the first handle portion in a rowing motion, the input assembly defining a substantially linear path (e.g. P, Fig. 4) for the first handle portion from the first position to the second position.

Claim 15. A row exercise machine comprising: a frame (e.g. para [0021], Fig. 2, element 12); an input assembly (e.g. para. [0020], Fig. 1, element 2) pivotably mounted to the frame forward and above of a user, the input assembly including a first handle portion (e.g. para. [0026], Fig. 4, element 52) and a second handle portion (e.g. para. [0026], Fig. 4, element 54) and defining a substantially linear path (e.g. Fig. 4, P) for the first handle portion and the second handle portion from a first position to a second position (e.g. para [0020], Fig. 1) by a pulling force (e.g. Fig. 4, P) exerted by a user on the first handle portion in a rowing motion; and a resistance mechanism (e.g. para. [0028], element 60) operably connected to the input assembly.

Claim 23. A row exercise machine comprising: a frame (e.g. para [0021], Fig. 2, element 12); user support structure mounted to the frame including a seat and a chest pad (e.g. para [0021], elements 20, 22); an input assembly pivotably mounted to the frame forward and above of the seat, the input assembly including a pair of four-bar linkage mechanisms (e.g. para [0022], elements 30a, 30b) each having a primary lever arm (e.g. para [0020], elements 32a) pivotable about a primary axis, a secondary lever arm (e.g. para [0020], elements 34a) pivotable about a secondary axis, a pair of handle portions (e.g. para. [0026], Fig. 4, element 52, 54) operably operatively associated with one each of the primary and secondary lever arms and

defining a substantially linear path when moved from a first position to a second position (e.g. para [0020], Fig. 1), wherein the pair of handle portions travel to a nadir of the substantially linear path (e.g. Fig. 4, P) as the pair of handle portions are moved from the first position to the second position and the pair of handle portions travel to an apex of the substantially linear path as the pair of handle portions are moved from the second position to the first position; and a resistance mechanism (e.g. para. [0028], element 60)operably connected to the input assembly.

VI. GROUNDS OF REJECTION TO BE REVIEWED (37 C.F.R. 41.37(c)(1)(vi))

The Examiner has rejected all claims, claims 1-25, on the basis that the one cited reference, the Giannelli '447 reference, U.S. patent no. 5,997,447 renders the claims obvious under Section 103(a).

The primary considerations on this appeal are:

(a) Whether the prior art Giannelli '447 reference discloses, as called for by all of the independent claims a *rowing* machine.

(b) Whether the prior art Giannelli '447 reference discloses, as called for by claims 1 and 15 a rowing machine having a handle adapted to be moved from a first position to a second position in a substantially linear path by a *pulling* force.

(c) Whether the prior art Giannelli '447 reference discloses, as called for by claim 23 a rowing machine having handles that move in a *substantially linear path* from start to finish.

(d) Whether the prior art Giannelli '447 reference discloses, as called for by claim 23 a rowing machine *having a chest pad* for resisting a pulling motion exerted by the user in pulling the handles.

VII. ARGUMENT (37 C.F.R. 41.37(c)(1)(vii))

The Section 103(a) Rejection Should be Reversed/Withdrawn

The prior art Giannelli '447 reference does not teach every element of any of the independent claims 1, 15 or 23 and is not really analogous to the apparatus of the this application such that an obviousness rejection should/can fairly apply.

Independent Claims 1 and 15

Claims 1 and 15 both call for a *rowing machine* having a first handle portion that is adapted to be moved from a first position to a second position *by a pulling force* (e.g. Fig. 4, P) exerted by a user on the first handle portion *in a rowing motion* (e.g. Fig. 4, P, e.g. See paras. [0030]-[0032] describing operation of the machine requiring the user to exert a *pulling* motion and/or to *pull backwardly* in order to effect a resistance from the weight stack and to perform the exercise.

Similarly, claim 23 calls for a *rowing machine* that includes a pair of primary and secondary lever arms arranged in a *four bar linkage* arrangement having a handle that is moved in a *substantially linear path* in the course of being pulled from a first *rowing* position to a second *rowing* position.

The Only Exercise Machine and Exercise Motion Described In the Specification and Claimed In The Claims is A Row-Exercise Machine that Requires Pulling

The specification is clear that it is dealing exclusively with a *rowing* and an exercise machine that requires *pulling* force as the exercise. The only apparatus described in the specification is a pulling/rowing exercise apparatus. For example, at paragraphs [0030]-[0032] of the specification, the operation, components and function of the apparatus are described as follows:

> [0030] In an embodiment, as shown in FIGS. 2- 5, the handles 38*a* and 38*b* are operably connected to the weight stack 60 via the transmission system 64. A pair of frame pulleys 76 are mounted to the vertical support 18 of the support frame 12. A lifting pulley 78 is operably connected to the handles 38*a* and 38*b* by a first cable 80, wherein the first cable 80 is

threaded about and through the pair of frame pulleys 76, such that the lifting pulley 78 is positioned above the second cam 70. A lifting cable 82 connects the lifting pulley 78 to the second cam 70, where the second cam 70 is caused to rotate ***when at least one of the handles 38a or 38b is pulled back***.

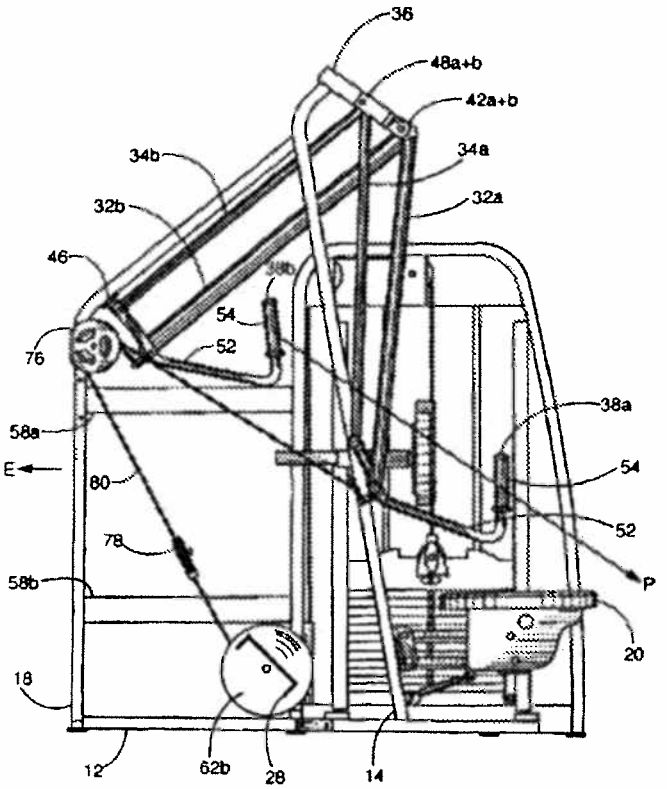
[0031] A belt 84 is attached at one end to the first cam 68, extending over the weight stack pulleys 72*a* and 72*b* and attached to the weight stack 60 at the opposite end. (See also FIG. 5). ***As the user pulls back on the handles*** 38*a* and 38*b*, the lifting pulley 78 is raised, causing the lifting cable 80 to unwind and rotate the second cam 70. As the second cam 70 rotates, the shaft 66 and the first cam 68 rotate as well. The rotation of the first cam 68 pulls the belt 84 over the weight stack pulleys 72*a* and 72*b*, and thus lifts the weight stack 60.

[0032] In an exemplary method of operation, a weight is selected on the main weight stack 60 by placing a pin (not shown) in one of the holes, as is known in the art. The user adjusts the seat 20 and chest pad 22 to a suitable position on the front leg 14. For example, a user with a longer torso will adjust the seat to a lower height such that the handles 38*a* and 38*b* are positioned at a comfortable height parallel with the users shoulders. The chest pad 22 is adjusted such that when the user grasps the handles tension is placed on the lifting cable 80. ***The user grasps the handles 38a and 38b and pulls back*** causing the lifting pulley 78 to be raised. As the lifting pulley 78 is raised, the first cam 70, shaft 66, and second cam 68 rotate, pulling on the belt 84 and lifting the selected weight. The user then returns the handles 38*a* and 38*b* to the initial position, thereby lowering the weight. ***When the user pulls the handles 38a and 38b back***, the resistance provided by the weight is overcome. ***When the user returns the handles 38a and 38b, the user succumbs to the resistance provided by the weight.***

The figures of the present application also make clear that the language of the claims are directed to a rowing machine. A good example is Figure 4 of the application which shows the handles in a distal starting position relative to the user on the seat and shows clearly the *substantially linear* path P along which the handles travel in the rowing motion:

Row-Exercise of This Application

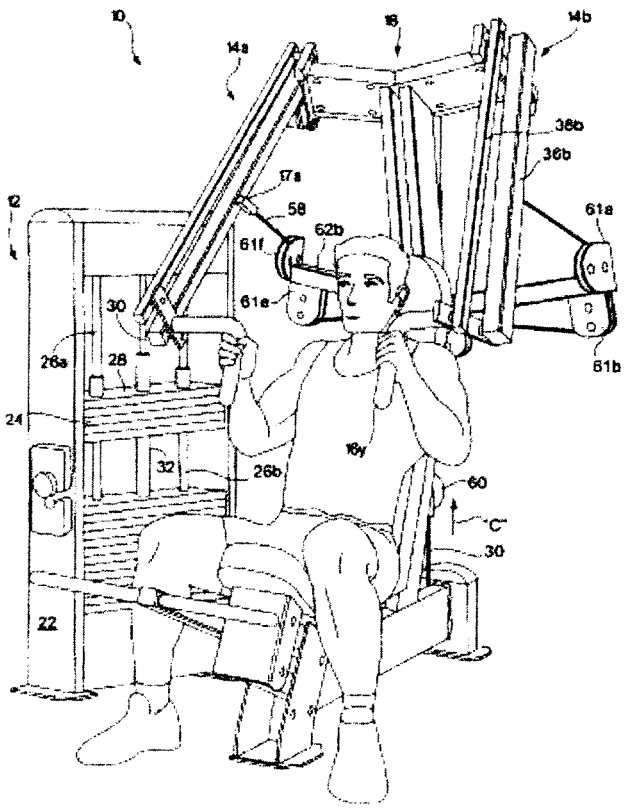
FIG. 4



Furthermore, claim 23 calls for a *chest pad* as a component. The purpose of the chest is to oppose the *row-pulling* motion on the handles. No such component is present or even usable in the prior art Giannelli '447 apparatus.

The prior art Giannelli '447 machine cited by the Examiner is not fairly analogizable to the present application. It is a *chest press* machine. As can be seen from the '447 patent's figures, this machine is dealing exclusively with a structure, components and a motion that is contrary to the structure and motion of a rowing machine. A chest press exercise machine and motion is a different field of structure and exercise from a row machine. Figure 5 of the cited '447 prior art is a good example of the difference in motion, structure and purpose of the machine:

The Cited Chest Press



The examiner cites this machine as anticipating or rendering the claims of this application obvious. In fairness the only truly relevant structure of this machine to the presently claimed apparatus is a four-bar linkage. The presence, in a vacuum, of a four bar linkage is not nearly enough to arrive at a conclusion of obviousness.

In the Giannelli '447 machine, the user typically leans back against a *backrest* for support in a chest press. No such structure or functional equivalent is used in a rowing machine

In the Giannelli '447 machine, the user typically engages the handles from a *shoulder high position* in a chest press. No such motion or action is required or possible in a rowing machine.

In the Giannelli '447 machine, the handles are arranged and engaged at a *should high position* in a chest press. No such motion or action is required or possible in a rowing machine.

In the Giannelli '447 machine, the user *pushes against* the handles to move them in a *curvilinear path* from back to front. No such motion or action is required or possible in a rowing machine.

A Rowing Exercise-Machine is Contrary to A Chest Press Exercise-Machine

The '447 cited by the Examiner decribes repeatedly throughout that the user *pushes* the handles through a *curvilinear path* from a chest to shoulder high rest position to a fully extended outward or forward position. This is *opposite* the presently claimed invention.

The present invention describes a row exercise machine where the user *pulls* on the handles in order to effect resistance and pulls in a *substantially linear path.* The examiner's comment that a linear path cannot be sufficiently distinguished from a curvilinear path does not take into account any of the distinct structures or functions of the claimed apparatus.

The prior art must be such that it is "reasonably pertinent to the particular problem with which the invention was involved" in order for obviousness to apply in view thereof. Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1535, 218 U.S.P.Q. 871, 876 (Fed. Cir. 1983). There is no reason, suggestion, or motivation in the Giannelli '447 *chest press* or elsewhere in the prior art that deal with the *same problem* as the claims of this application deal with, i.e. a *rowing machine..* Ruiz v. Foundation Engineering Systems, Inc., 234 F.3d 654 (Fed. Cir. 2000).

It is fundamental to the law of obviousness that it is improper to rely on references that do not pertain to the same field of art to arrive at a conclusion of obviousness. See, In Re Dembiczak et al., 173 F.3d 994 (Fed. Cir. 1999), where the combination of decorated paper trash bag art, with plastic trash bag art, to find claims of an invention to decorated plastic trash bags obvious, was found improper.

The Section 102 Rejection

To the extent there remains a Section 102 anticipation rejection in this case, such rejection should be reversed for at least the following reasons.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Ex Parte Swope, 2004 Pat. App. LEXIS 30, (Bd.Pat.App. 2004).

For all of the reasons noted above, the Giannelli '447 reference simply does not contain every element of any of independent claims 1, 15 or 23. For at least the same reasons that the claims are not obvious, they are not anticipated.

CONCLUSION

For the reasons stated above, it is respectfully requested that the examiner's rejection of claims 1-25 of the present application be reversed and that the present application be allowed for issuance.

Respectfully submitted,

/M. Lawrence Oliverio/ Date: 2007-07-16

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VIII APPENDIX OF CLAIMS (37 C.F.R. 41.37(c)(1)(viii))

The text of the claims involved in the appeal are:

1. A row exercise machine comprising an input assembly including a first handle portion adapted to be moved from a first position to a second position by a pulling force exerted by a user on the first handle portion in a rowing motion, the input assembly defining a substantially linear path for the first handle portion from the first position to the second position.

2. The exercise machine exercise machine according to claim 1, further comprising a second handle portion, wherein the first handle portion and the second handle portion travel in diverging planes as the first handle portion and the second handle portion are moved from the first position to the second position.

3. The exercise machine exercise machine according to claim 1, further comprising a second handle portion, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

4. The exercise machine exercise machine according to claim 1, further comprising a frame, wherein the input assembly is pivotally mounted to the frame.

5. The exercise machine exercise machine according to claim 4, wherein the input assembly is pivotally mounted to the frame forward and above a user.

6. The exercise machine exercise machine according to claim 1, further comprising a resistance mechanism operably connected to the input assembly.

7. The exercise machine exercise machine according to claim 1, wherein the first handle portion is substantially vertically oriented.

8. The exercise machine according to claim 1, wherein, the first handle portion travels to a nadir of the substantially linear path as the first handle portion is moved from the first position to

the second position and the first handle portion travels to an apex of the substantially linear path as the first handle portion is moved from the second position to the first position.

9. The exercise machine according to claim 8, further comprising a second handle portion operatively connected to the input assemble, the second handle portion traveling to the nadir of the substantially linear path as the second handle portion is moved from the first position to the second position and the second handle portion traveling to the apex of the substantially linear path as the second handle portion is moved from the second position to the first position.

10. The exercise machine according to claim 9, wherein the first handle portion and the second handle are adapted to be grasped by a user, such that the forearms of a user remain substantially parallel to the ground as the first handle portion and the second handle are moved from the first position to the second position and the first handle portion and the second handle portion are moved from the second position to the first position.

11. The exercise machine according to claim 9, wherein the first handle portion and the second handle travel in diverging planes as the first handle portion and the second handle are moved from the first position to the second position.

12. The exercise machine according to claim 9, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

13. The exercise machine according to claim 9, wherein the input assembly comprises a pair of four-bar linkage mechanisms pivotally connected to the frame, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and the first handle portion and the second handle portion operatively associated with one each of the primary and secondary lever arms.

14. The exercise machine according to claim 1, further comprising a user support structure including: a seat mounted to the frame; and a chest pad mounted to the frame above and in front of the seat.

15. A row exercise machine comprising: a frame; an input assembly pivotably mounted to the frame forward and above of a user, the input assembly including a first handle portion and a second handle portion and defining a substantially linear path for the first handle portion and the second handle portion from a first position to a second position by a pulling force exerted by a user on the first handle portion in a rowing motion; and a resistance mechanism operably connected to the input assembly.

16. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel to a nadir of the substantially linear path as the first handle portion and the second handle portion are moved from the first position to the second position and the first handle portion and the second handle portion travel to an apex of the substantially linear path as the first handle portion and the second handle portion are moved from the second position to the first position.

17. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel in diverging planes as the first handle portion and the second handle portion are moved from the first position to the second position.

18. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion travel in converging planes as the first handle portion and the second handle portion are moved from the second position to the first position.

19. The exercise machine exercise machine according to claim 15, wherein the first handle portion and the second handle portion are substantially vertically oriented.

20. The exercise machine according to claim 15, wherein the first handle portion and the second handle portion are adapted to be grasped by a user, such that the user's forearms remain substantially parallel to the ground as the first handle portion and the second handle portion are moved.

21. The exercise machine according to claim 15, wherein the input assembly comprises a pair of four-bar linkage mechanisms pivotally connected to the frame, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, and the first handle portion and the second handle portion operatively associated with one each of the primary and secondary lever arms.

22. The row exercise machine according to claim 15, further comprising a user support structure including: a seat mounted to the frame; and a chest pad mounted to the frame above and in front of the seat.

23. A row exercise machine comprising: a frame; user support structure mounted to the frame including a seat and a chest pad; an input assembly pivotably mounted to the frame forward and above of the seat, the input assembly including a pair of four-bar linkage mechanisms each having a primary lever arm pivotable about a primary axis, a secondary lever arm pivotable about a secondary axis, a pair of handle portions operably operatively associated with one each of the primary and secondary lever arms and defining a substantially linear path when moved from a first position to a second position, wherein the pair of handle portions travel to a nadir of the substantially linear path as the pair of handle portions are moved from the first position to the second position and the pair of handle portions travel to an apex of the substantially linear path as the pair of handle portions are moved from the second position to the first position; and a resistance mechanism operably connected to the input assembly.

24. The exercise machine according to claim 22, wherein the pair of handle portions travel in diverging planes as the pair of handle portions are moved from the first position to the second position.

25. The exercise machine according to claim 22, wherein the pair of handle portions travel in converging planes as the pair of handle portions are moved from the second position to the first position.

(IX) EVIDENCE APPENDIX

(None)

(X) RELATED PROCEEDINGS APPENDIX

(None)

Electronic Patent Application Fee Transmittal

Application Number:	10378261
Filing Date:	03-Mar-2003
Title of Invention:	Rowing machine
First Named Inventor/Applicant Name:	Raymond Giannelli
Filer:	Michael L. Oliverio/Dawn Class
Attorney Docket Number:	C016/7092US2

Filed as Large Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Filing a brief in support of an appeal	1402	1	500	500
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 4 months with $0 paid	1254	1	1590	1590
Miscellaneous:				
			Total in USD ($)	**2090**

Electronic Acknowledgement Receipt	
EFS ID:	1974858
Application Number:	10378261
International Application Number:	
Confirmation Number:	1700
Title of Invention:	Rowing machine
First Named Inventor/Applicant Name:	Raymond Giannelli
Customer Number:	21127
Filer:	Michael L. Oliverio/Dawn Class
Filer Authorized By:	Michael L. Oliverio
Attorney Docket Number:	C016/7092US2
Receipt Date:	16-JUL-2007
Filing Date:	03-MAR-2003
Time Stamp:	14:49:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$2090
RAM confirmation Number	61
Deposit Account	023038
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		appealbrief.pdf	543267 074e922b412c96765efacc25e95beeca804d0df2	yes	20

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Extension of Time	2	3
	Appeal Brief Filed	4	20

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	8292 ac25883d0225728a8b6f6b6dec4ed08903186d4b	no	2

Warnings:

Information:

Total Files Size (in bytes):	551559

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

TRANSMITTAL OF APPEAL BRIEF	Docket No. C016/7092US2

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764
Conf. No.:	1700

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Transmitted herewith is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on January 16, 2007.

Status of Applicant

This application is on behalf of Raymond Giannelli.

☐ Applicant claims small entity status.

Extension of Time

☐ The proceedings herein are for a patent application and the provisions of 37 C.F.R.1.136 apply. An extension of time of 4 months is requested.

Fee Due

Appeal Brief Fee	500.00
Extension of Time Fee	1590.00
TOTAL FEE	**2090.00**

Payment

☐ Enclosed is a check in the amount of the total fee.

☒ The Commissioner is authorized to charge the total fee to Deposit Account No. 02-3038.

☒ The Commissioner is hereby authorized to charge any other fees under 37 C.F.R. §1.16 and §1.17 that may be required, or credit any overpayment, to Deposit Account No. 02-3038.

/M. Lawrence Oliverio/ Date: 2007-07-16

M. Lawrence Oliverio, Esq. Reg. No. 30,915
Rissman Jobse Hendricks & Oliverio, LLP
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/378,261	03/03/2003	Raymond Giannelli	C016/7092US2	1700

21127 7590 02/05/2008

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EXAMINER	
DONNELLY, JEROME W	

ART UNIT	PAPER NUMBER
3764	

MAIL DATE	DELIVERY MODE
02/05/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/378,261
Filing Date: March 03, 2003
Appellant(s): GIANNELLI, RAYMOND

Lawrence Oliverio 30,915
For Appellant

EXAMINER'S ANSWER

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

This appeal involves claims 1-25.

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

Grouping of Claims

The rejection of claims 1-25 stand or fall together because appellants brief does not include a statement that this grouping of claims does not stand or fall together and reasons and reasons in support thereof. See 37 CFR 1.192(c)(7).

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

5997447 Giannelli et al 12-1999

Applicant arguments argue that the claims claim a device as traveling in a "linear path". The claims however as originally present and as now amended claim a device which has handles which travel in a substantially linear path. Given applicants claims of substantially linear, it would lead one to believe that the applicant is trying to cover or present a claim limitation which will encompass a path of travel which is broader in scope that straight. Absent any clarification by the applicant the examiner the **is of the** opinion that if the path of applicants invention is not completely linear then it must encompass the disclosure of Giannelli (447) of being slightly curvilinear.

The examiner can not patentably distinguish between the disclosure of slightly curvilear and the claim language substantially linear.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giannelli et al.

The examiner reminds the applicant that in response to the functionality of his device and the disclosure of how his invention is being used: The examiner notes that although it is disclosed that Giannelli is to be used in a pushing motion Giannelli is also capable of being pulled by the user of the device. The user is not limited to, or confined to a seat when using the device.

As to the device of Giannelli et al disclosuring all of the claimed elements of the device Giannelli discloses a device including a four bar linkage first and second handles which travel in a diverging plane as the first and second handle portions are moved from a first position to a second position, said first and second handle mounted to the frame forward and above the user, resistance mechanism said handle being vertically oriented a seat; and,

Wherein a users for arms remain substantially parallel to a supporting surface as the handles are moved.

As to applicants claims of a chest pad, element (27) meets the claim language of a pad.

As to the applicants claims of substantially linear. The abstract of Giannelli et al meets said claim language of slightly curvilinear. Neither of these limitations meets the rigid limitation of being 100% linear.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

MICHAEL A. BROWN
PRIMARY EXAMINER

Jerome Donnelly 10-01-07

Conferees:

JEROME DONNELLY
PRIMARY EXAMINER

ANGELA D. SYKES
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700

REQUEST FOR ORAL HEARING	Docket No. C016-7092US2

Applicant:	Raymond Giannelli
Serial No:	10/378,261
Filed:	March 3, 2003
For:	ROWING MACHINE
Examiner:	Jerome W. Donnelly
Art Unit:	3764
Conf. No.:	1700

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This request is in furtherance of the Notice of Appeal, filed in this case on January 16, 2007.

REQUEST FOR ORAL HEARING

To the extent there is any question that the Examiner's rejection should not be reversed on this appeal, Applicants request an oral hearing on the present appeal.

The fees of $1,030.00 required under § 41.20(b)(3), and any required petition for extension of time for filing this request are dealt with in the accompanying TRANSMITTAL LETTER.

Respectfully submitted

/M. Lawrence Oliverio/ Date: 2008-03-31

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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/378,261	03/03/2003	Raymond Giannelli	C016/7092US2	1700

21127 7590 05/02/2008
RISSMAN JOBSE HENDRICKS & OLIVERIO, LLP
100 Cambridge Street
Suite 2101
BOSTON, MA 02114

EXAMINER	
DONNELLY, JEROME W	
ART UNIT	**PAPER NUMBER**
3764	

MAIL DATE	DELIVERY MODE
05/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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P.O. Box 1450
Alexandria, VA 22313-1450
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/378,261
Filing Date: March 03, 2003
Appellant(s): GIANNELLI, RAYMOND

Lawrence Oliverio 30,915
For Appellant

EXAMINER'S ANSWER

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The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

This appeal involves claims 1-25.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

5997447 Giannelli et al 12-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giannelli et al.

The examiner reminds the applicant that in response to the functionality of his device and the disclosure of how his invention is being used: The examiner notes that although it is disclosed that Giannelli is to be used in a pushing motion Giannelli is also capable of being pulled by the user of the device. The user is not limited to, or confined to a seat when using the device.

As to the device of Giannelli et al disclosuring all of the claimed elements of the device Giannelli discloses a device including a four bar linkage first and second handles which travel in a diverging plane as the first and second handle portions are moved from a first position to a second position, said first and second handle mounted to the frame

forward and above the user, resistance mechanism said handle being vertically oriented a seat; and,

Wherein a users for arms remain substantially parallel to a supporting surface as the handles are moved.

As to applicants claims of a chest pad, element (27) meets the claim language of a pad.

As to the applicants claims of substantially linear. The abstract of Giannelli et al meets said claim language of slightly curvilinear. Neither of these limitations meets the rigid limitation of being 100% linear.

(10) Response to Argument

Applicant arguments argue that the claims claim, a device as traveling in a "linear path". The claims however as originally present and as now amended claim a device which has handles which travel in a substantially linear path. Given applicants claims of substantially linear, it would lead one to believe that the applicant is trying to cover or present a claim limitation which will encompass a path of travel which is broader in scope that straight. Absent any clarification by the applicant the examiner the **is of the** opinion that if the path of applicants invention is not completely linear then it must encompass the disclosure of Giannelli (447) of being slightly curvilinear.

The examiner can not patentably distinguish between the disclosure of slightly curvilear and the claim language substantially linear.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

Applicant claims of "forward" in claim 1 are relative to the orientation of a user.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

MICHAEL A. BROWN
PRIMARY EXAMINER

Jerome Donnelly 10-01-07

Conferees:

JEROME DONNELLY
PRIMARY EXAMINER

ANGELA D. SYKES
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/378,261	03/03/2003	Raymond Giannelli	C016/7092US2	1700

21127 7590 10/29/2012

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BOSTON, MA 02114

EXAMINER	
DONNELLY, JEROME W	
ART UNIT	PAPER NUMBER
3764	

NOTIFICATION DATE	DELIVERY MODE
10/29/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mbien-aime@rhoiplaw.com
cjoseph@rhoiplaw.com
info@rhoiplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RAYMOND GIANNELLI

Appeal 2010-007582
Application 10/378,261
Technology Center 3700

Before JOHN C. KERINS, EDWARD A. BROWN, and BENJAMIN D. M. WOOD, *Administrative Patent Judges.*

BROWN, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the rejection of claims 1-25. (App. Br. 2). We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

We AFFIRM.

THE CLAIMED SUBJECT MATTER

Independent claims 1, 15, and 23 are on appeal. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A row exercise machine comprising an input assembly including a first handle portion adapted to be moved from a first position to a second position by a pulling force exerted by a user on the first handle portion in a rowing motion, the input assembly defining a substantially linear path for the first handle portion from the first position to the second position.

THE REJECTION

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Giannelli (US 5,997,447; iss. Dec. 7, 1999).

ANALYSIS

Appellant argues claims 1 and 15 as a group, and does not provide separate argument for any one of dependent claims 2-14, 16-22, 24, and 25. (App. Br. 5-10; Reply Br. 2-3).[1] We select claim 1 as representative of the grouping, with claims 2-22, 24, and 25 standing or falling with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii)(2011).

The Examiner found Giannelli discloses that its device is used in a pushing motion, but found that the device is also capable of being pulled by the user. (Ans. 3).[2] The Examiner also found that a user is not limited to, or

[1] We herein refer to the Reply Brief dated May 27, 2008.
[2] We herein refer to the Examiner's Answer mailed May 2, 2008.

confined to, a seat when using Giannelli's device. (*Id.*). The Examiner further found that the claimed "substantially linear path" of the handle portion encompasses the slightly curvilinear (path) disclosed by Giannelli. (Ans. 4).

Appellant contends that the claims are directed to a row exercise machine that requires a pulling force (App. Br. 5-6), whereas Giannelli is directed to a chest press machine, and "[a] chest press exercise machine and motion is a different field of structure and exercise from a row machine." (App. Br. 7). Appellant further contends that Giannelli discloses that "the user *pushes* the handles through a *curvilinear path* from a chest to shoulder high rest position to a fully extended outward or forward position. This is *opposite* the presently claimed invention." (App. Br. 9).

Regarding Appellant's contention that Giannelli is not directed to a row exercise machine, the relevant issue is whether Giannelli's apparatus is capable of being used by exerting a pulling force on the handles in a rowing motion. Where the Patent and Trademark Office has reason to believe that a claimed functional limitation is an inherent characteristic of the prior art, the burden is shifted to Appellant to show that the prior art does not possess that characteristic. *See In re Best*, 562 F.2d 1252, 1254-55 (CCPA 1977) (quoting *In re Swinehart*, 439 F.2d 210, 212-13 (CCPA 1971)); *see also In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990) ("when the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.") In response to the Examiner's findings as to how Giannelli's apparatus is capable of being used, Appellant contends that Giannelli does not teach or suggest that "a user should stand on their feet and pull the arms," and that:

> The entire teaching of the Giannelli '447 disclosure is precisely the opposite of what the examiner contends that it is capable doing or how it is capable of being used. Even further, if a user were to stand on their feet and pull the handles, this would defeat the very purpose of the machine and the entire teaching of the disclosure.

(Reply Br. 2). These contentions are not persuasive.

Firstly, although Giannelli does not explicitly disclose the use of its structure as a row exercise machine, the absence of disclosure in Giannelli relating to this use or function is not dispositive. Rather, "[i]t is well settled that the recitation of a new intended use for an old product does not make a claim to that old product patentable." *See In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997) (citation omitted).

Secondly, Appellant has not provided any persuasive argument or evidence to show that Giannelli's apparatus is incapable of being used by exerting a pulling force on the handles in a rowing motion. In our view, it is reasonable to find that a user could face the handles 16a, 16b and support cushion 27 of Giannelli's apparatus and exert a pulling force on the handles 16a, 16b in a rowing motion, where the force is exerted in a direction that extends away from the support cushion 27 so as to move the handles 16a, 16b from a first position to a second position. (*See also* Giannelli, col. 4, l. 66 – col. 5, l. 10 and col. 5, ll. 46-50). Although such use may not fully achieve the "purpose" of Giannelli's apparatus, Appellant has not shown that the apparatus could not be used in such manner.

Appellant also contends that the Examiner's "comment that a linear path cannot be sufficiently distinguished from a curvilinear path does not take into account any of the distinct structures or functions of the claimed

apparatus." (App. Br. 9). As noted *supra*, however, the Examiner found that the claims recite a "*substantially* linear path" (emphasis added). Appellant has not provided any persuasive argument or evidence as to why the claimed "*substantially* linear path" (emphasis added) should be construed to not encompass Giannelli's "*slightly* curvilinear path" (emphasis added). The term "substantially" allows for the first handle portion to travel in a path that deviates from a perfectly linear path. In addition, claim 1 does not recite any limitation as to how far the first handle portion must move "from the first position to the second position." It is reasonable to find that as this distance decreases for movement of the handles in Giannelli's apparatus, the path would increasingly correspond to a linear path.

Appellant also contends that Giannelli is non-analogous prior art. (App. Br. 9; Reply Br. 5). The two *separate* tests for determining whether a reference is analogous prior art for purposes of a rejection under 35 U.S.C. § 103 are: (1) whether the reference is from the same field of endeavor, regardless of the problem addressed; and (2) *if* the reference is not within the inventor's field of endeavor, whether the reference is reasonably pertinent to the particular problem with which the inventor is involved. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). At the least, Appellant has not provided any persuasive argument as to why Giannelli does not meet test (1). The claimed invention is directed to the field of apparatuses for exercising the upper body. (Spec. para. [0003]). Giannelli is also directed to this same field of endeavor. (*See* Giannelli, col. 1, ll. 15-17). As such, we agree that Giannelli qualifies as analogous prior art.

In view of the above, we sustain the rejection of claim 1, as well as claims 2-22, 24, and 25.

Claim 23 is directed to a row exercise machine comprising, *inter alia*, a "user support structure mounted to the frame including a seat and a *chest pad*." (Emphasis added). The Examiner found Giannelli's support cushion 27 meets the claim limitation of a "chest pad." (Ans. 4). Appellant contends that "[t]he purpose of the chest [pad] is to oppose the *row-pulling motion* on the handles. No such component is present or even usable in the . . . Giannelli . . . apparatus." (App. Br. 7). This contention is not persuasive.

Claim 23 does not recite any structural limitation for the claimed "chest pad" that Giannelli's support cushion 27 lacks. In addition, the claim does not specify the location of the chest pad as opposing the row-pulling motion on the handles. Unclaimed features of the row exercise machine cannot be relied upon for patentability. *See In re Self*, 671 F.2d 1344, 1348 (Fed. Cir. 1982). As Appellant has not apprised us of any error in the Examiner's findings and conclusion, we sustain the rejection of claim 23.

DECISION

The Examiner's decision rejecting claims 1-25 is AFFIRMED.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

ke

US005997447A

United States Patent [19]

Giannelli et al.

[11] Patent Number: 5,997,447

[45] Date of Patent: *Dec. 7, 1999

[54] **CHEST PRESS APPARATUS FOR EXERCISING REGIONS OF THE UPPER BODY**

[75] Inventors: **Raymond Giannelli**, Franklin, Mass.; **Jerry K. Leipheimer**, Jamestown, Pa.

[73] Assignee: **Cybex International, Inc.**, Medway, Mass.

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/941,455**

[22] Filed: **Sep. 30, 1997**

Related U.S. Application Data

[60] Provisional application No. 60/025,529, Sep. 30, 1996.

[51] **Int. Cl.**[6] **A63B 21/06**; A63B 23/035

[52] **U.S. Cl.** **482/100**; 482/136

[58] **Field of Search** 482/72, 73, 94, 482/97–101, 112, 113, 129, 130, 133, 135–139

[56] **References Cited**

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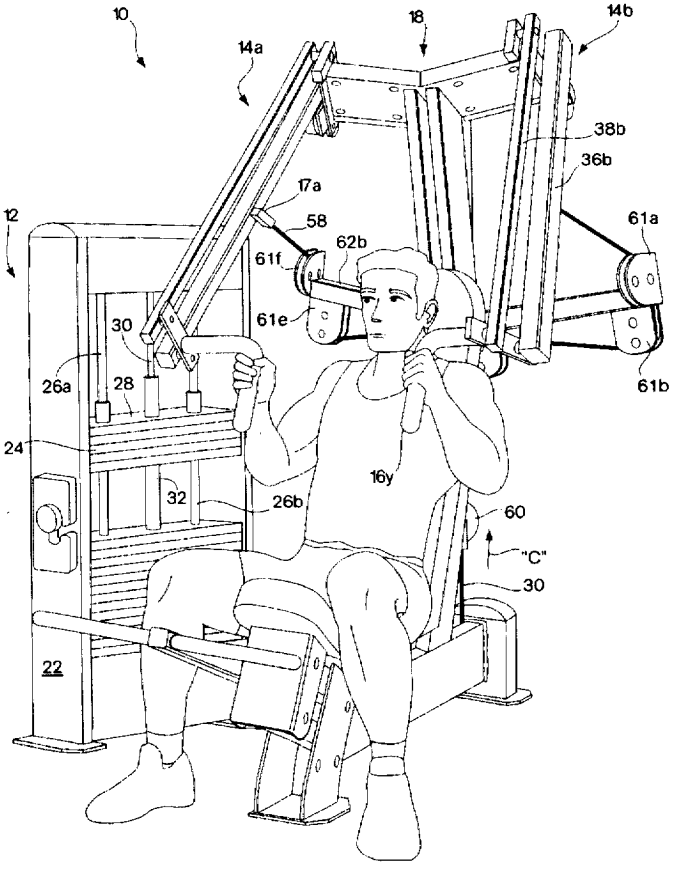
Primary Examiner—John Mulcahy

Attorney, Agent, or Firm—Wolf, Greenfield & Sacks, P.C.

[57] **ABSTRACT**

A chest press exercise apparatus is provided. The chest press apparatus includes a selectable weight mechanism and a support member which pivotably supports a pair of four-bar linkage mechanisms. The four-bar linkage mechanisms are pivotably mounted at their rearward ends about axes which are disposed at an angle relative to a horizontal plane, i.e. are tilted relative to vertical, such that a pair of elongated bars of the four-bar linkage mechanisms travel in planes which are tilted relative to vertical. The tilted planes through which the four-bar linkage mechanisms travel enable the handles to travel along a slightly curvilinear downwardly diverging path which simulates as natural a human musculoskeletal upward pushing motion as possible.

27 Claims, 16 Drawing Sheets



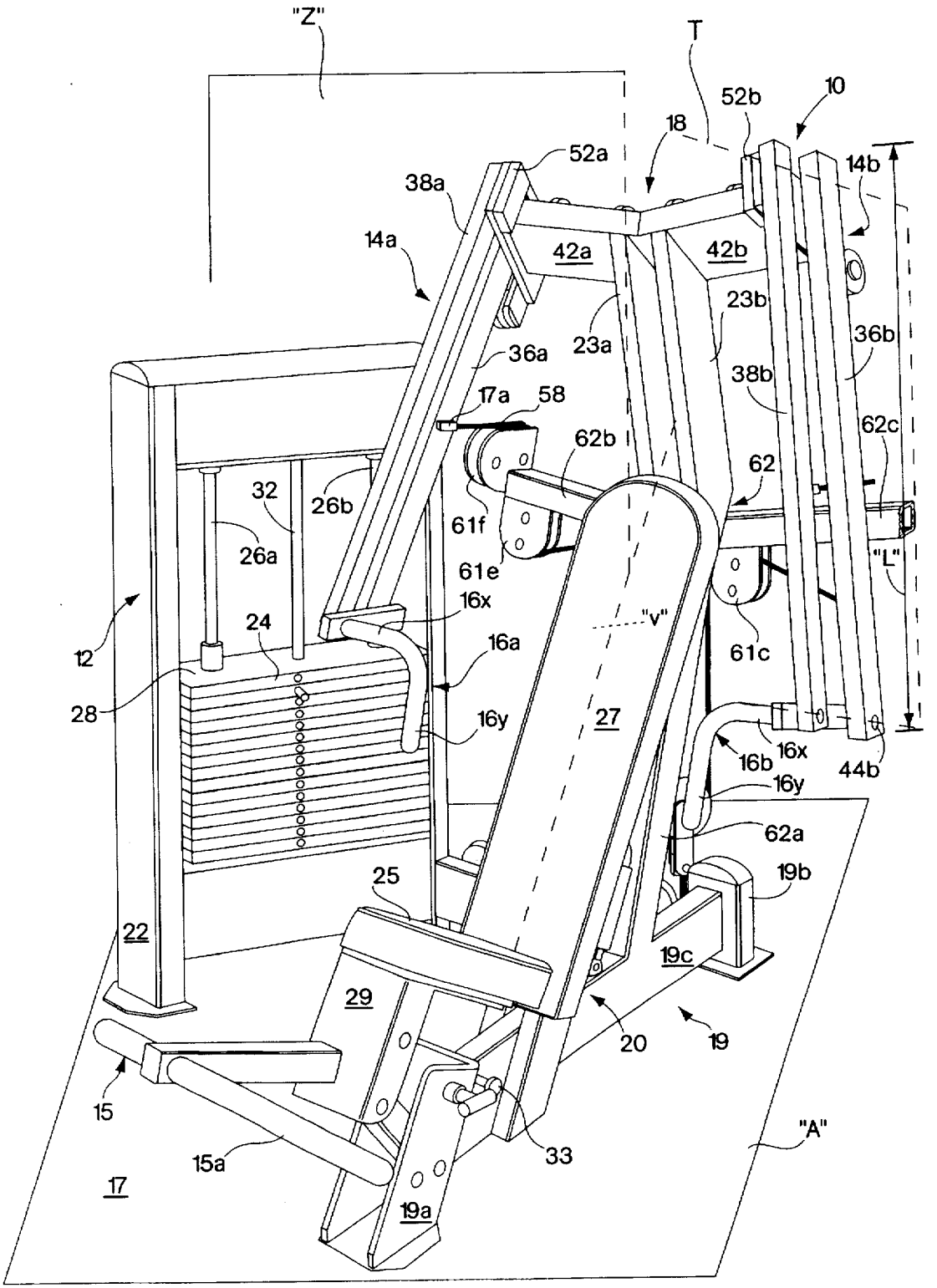

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Fig. 1

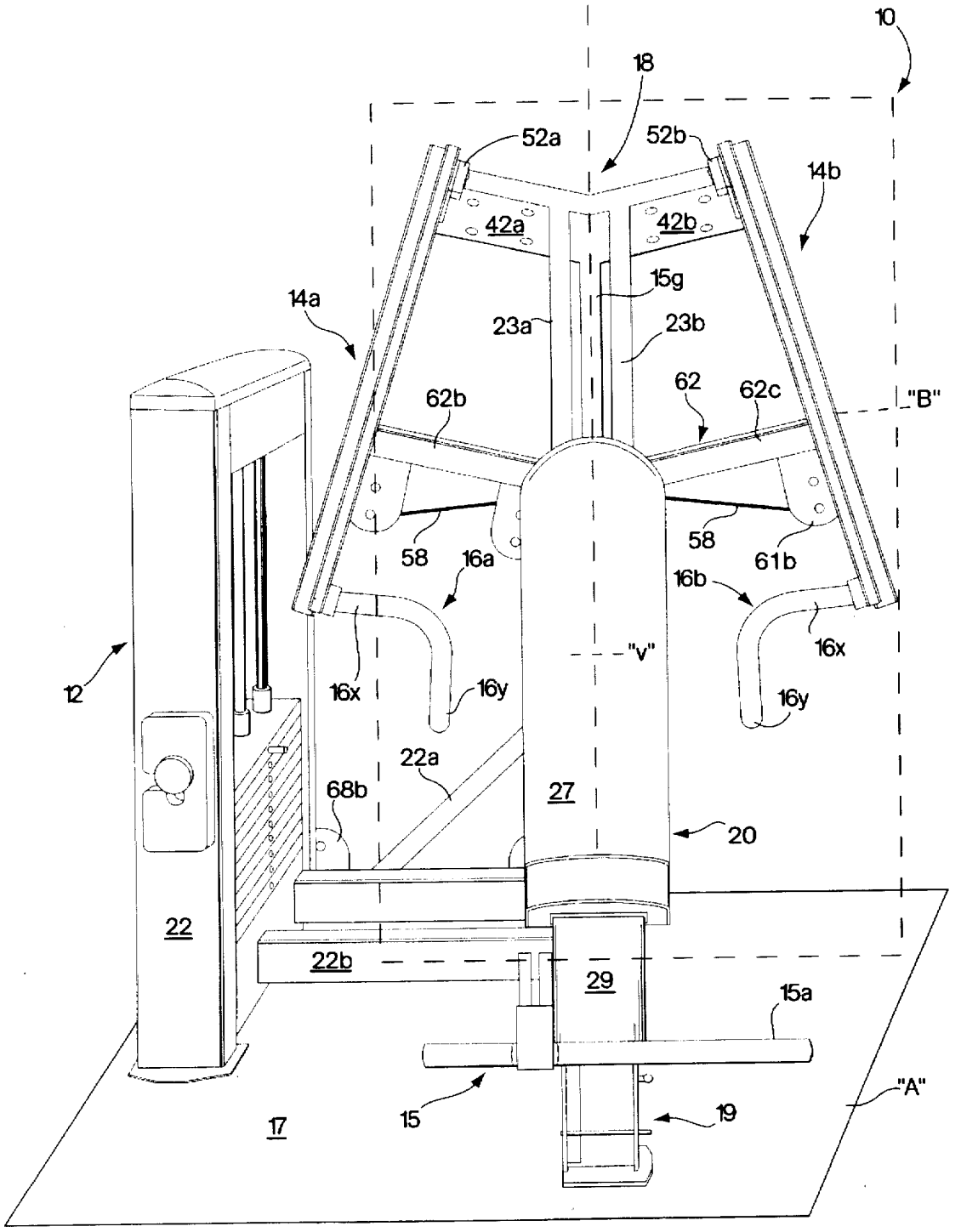
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Fig. 2

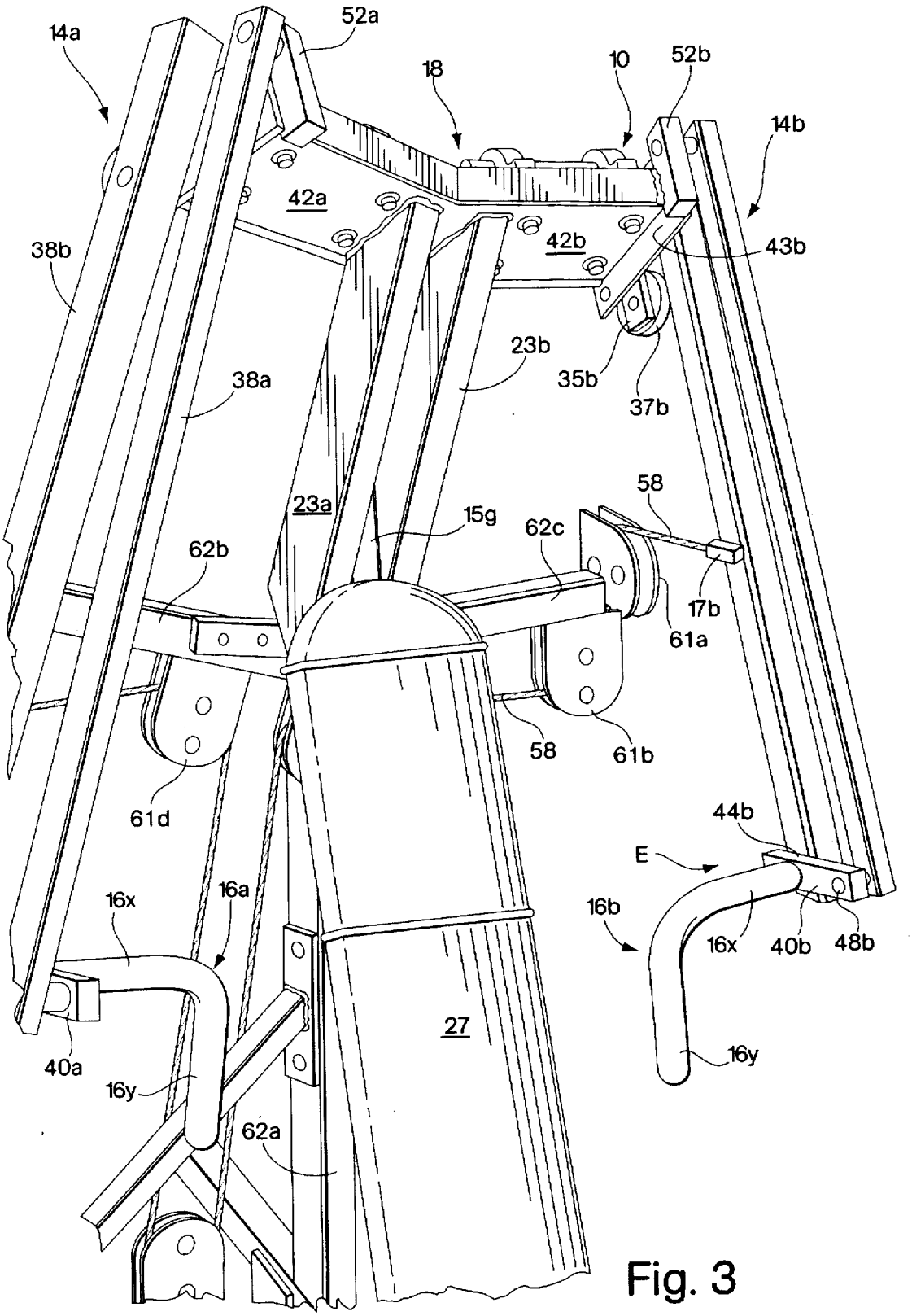
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Fig. 3

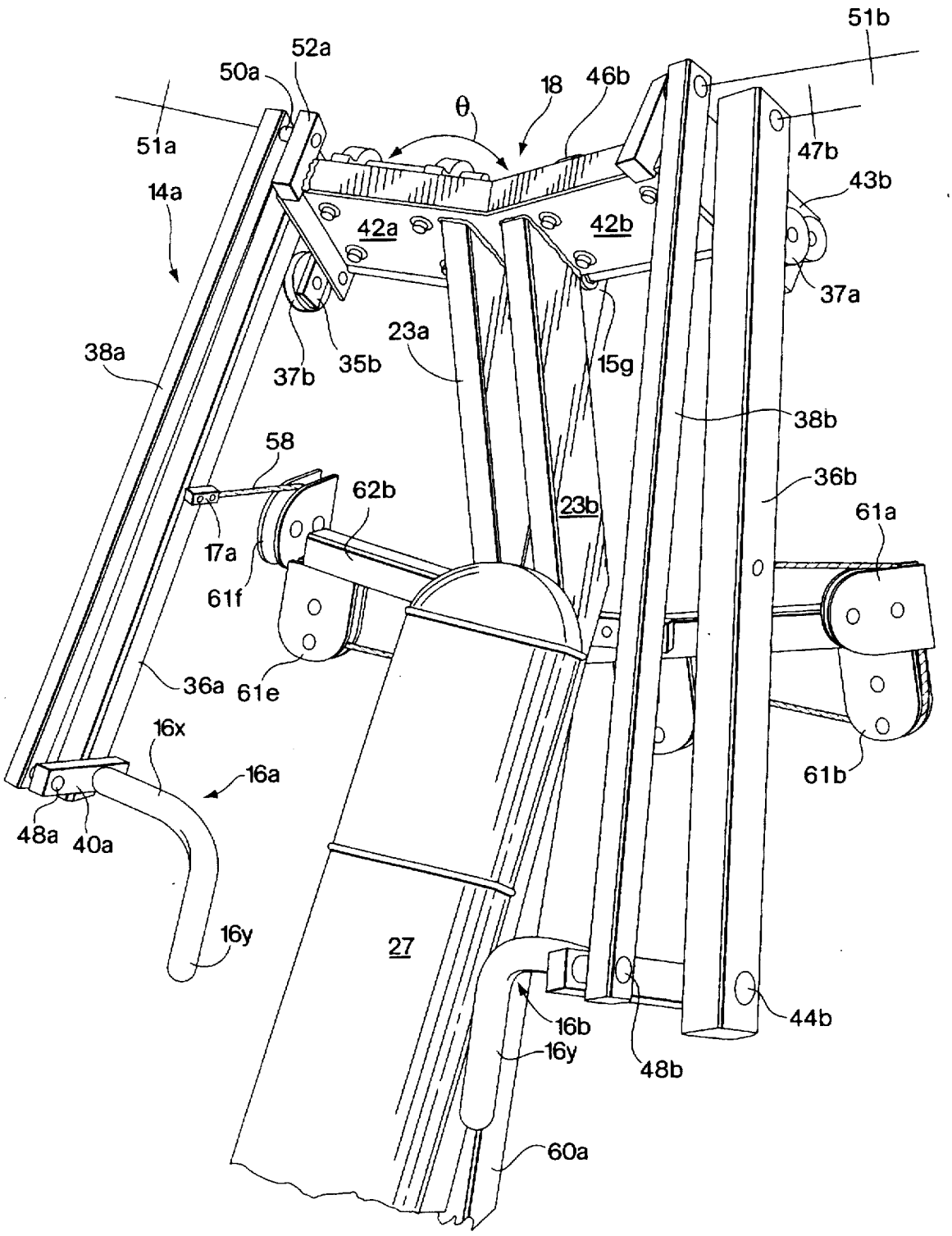
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Fig. 4

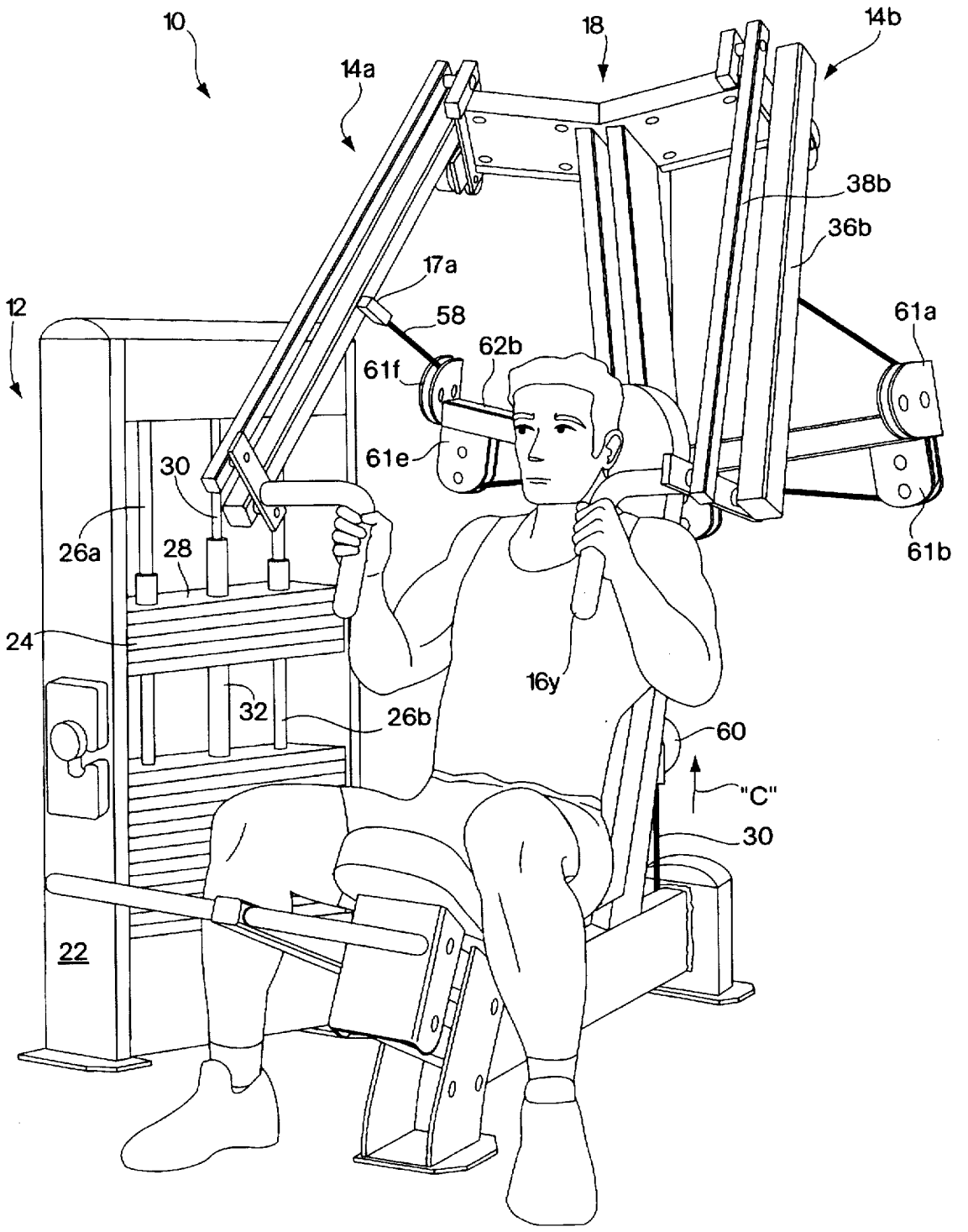
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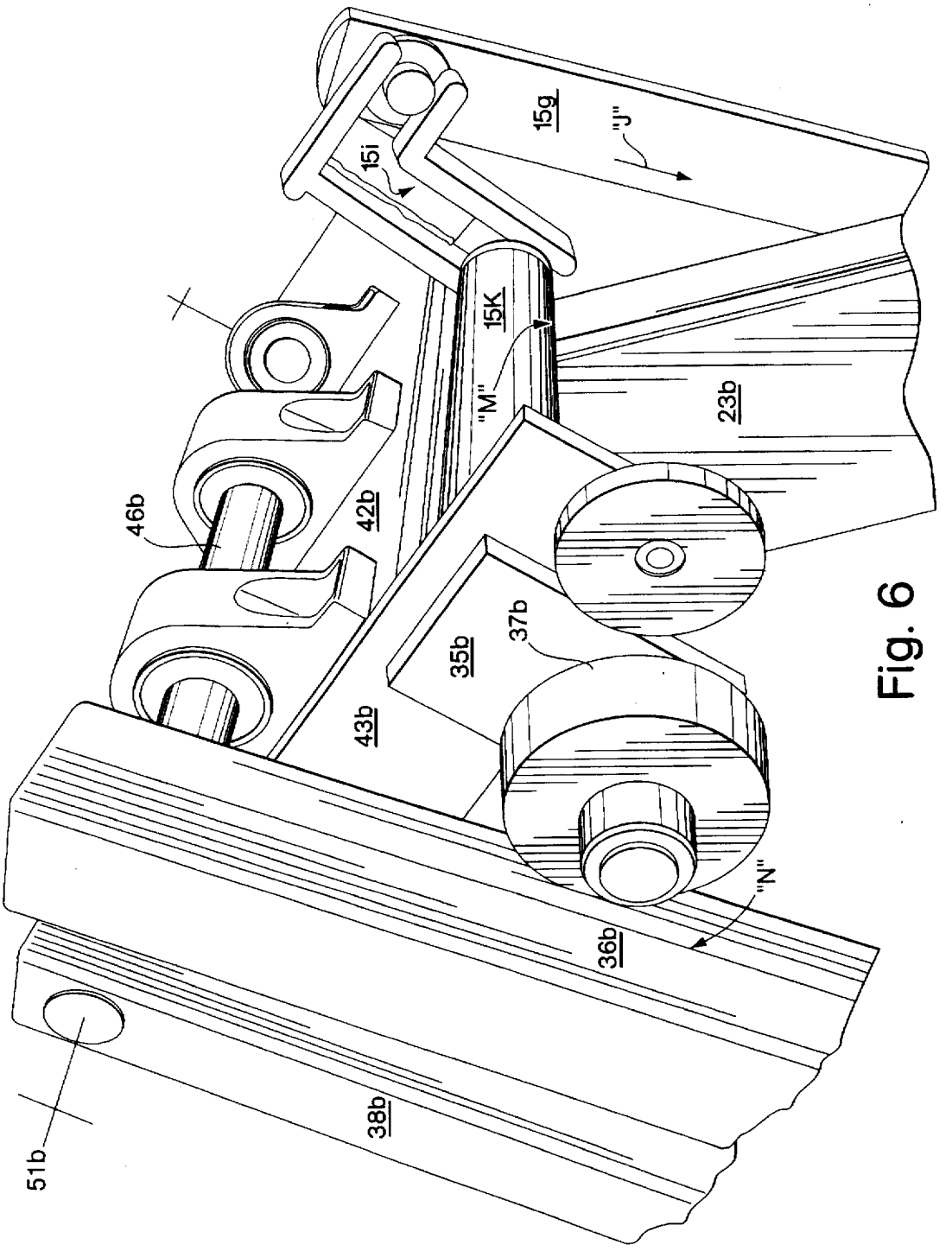
Fig. 5



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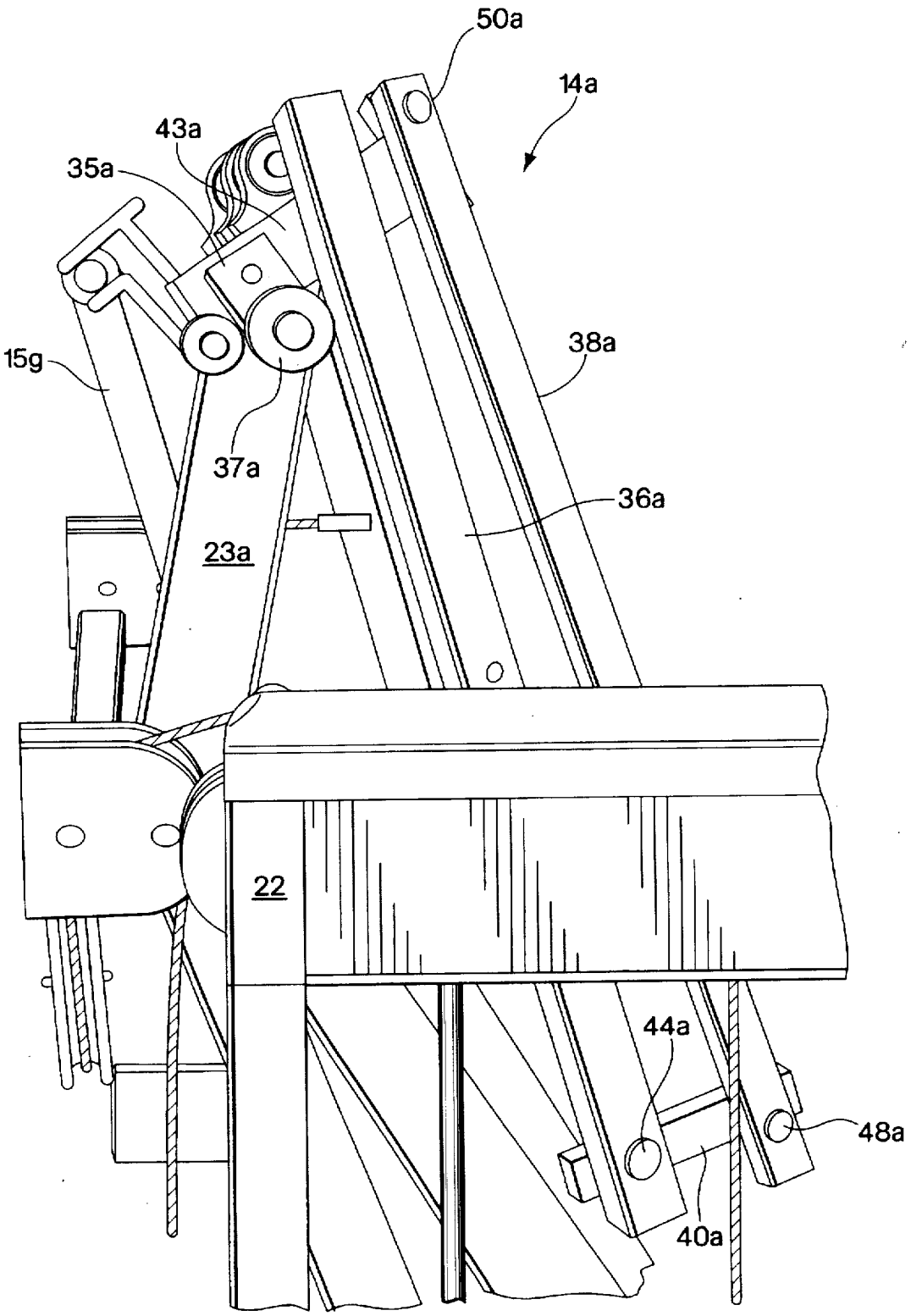

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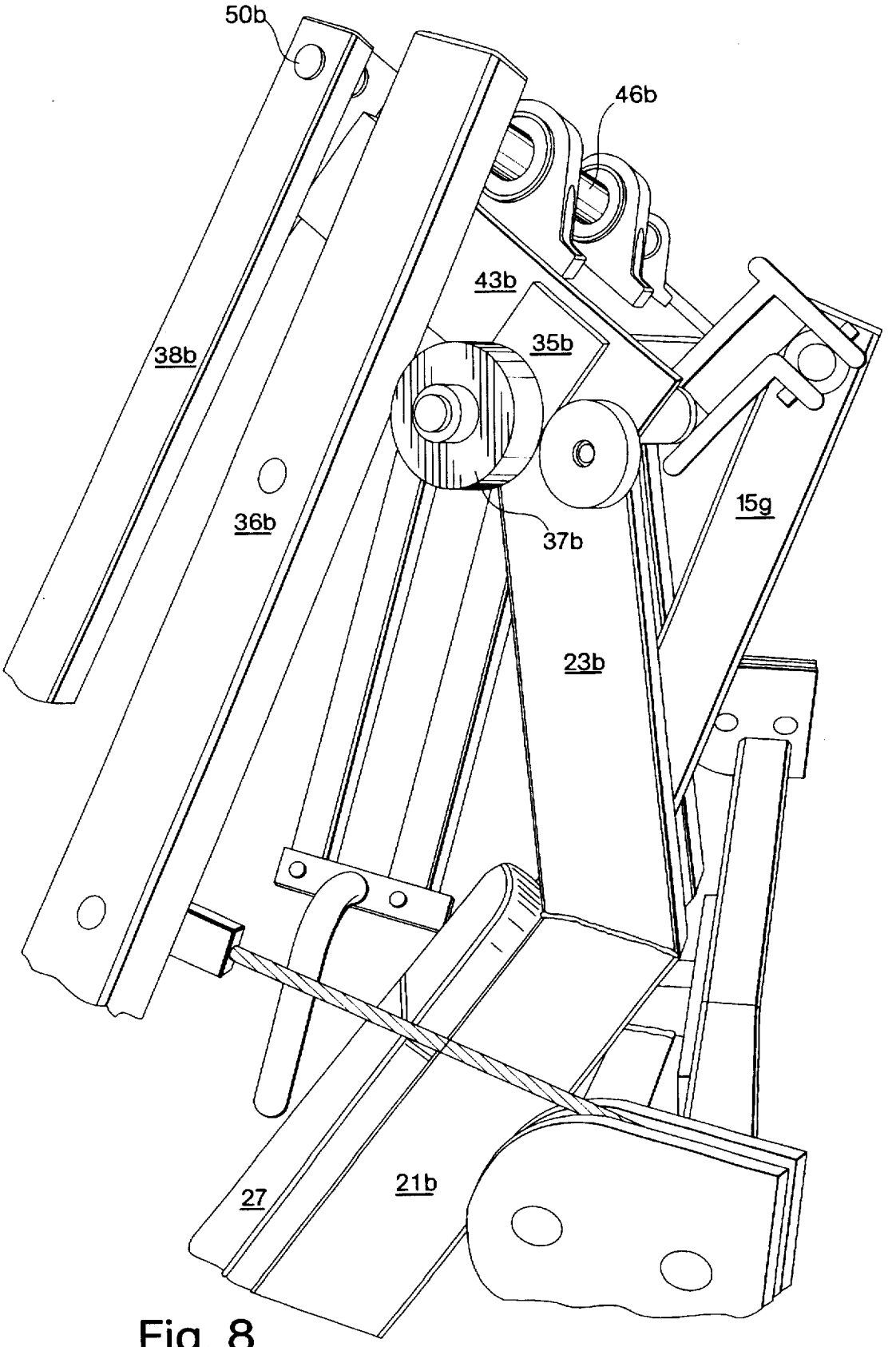
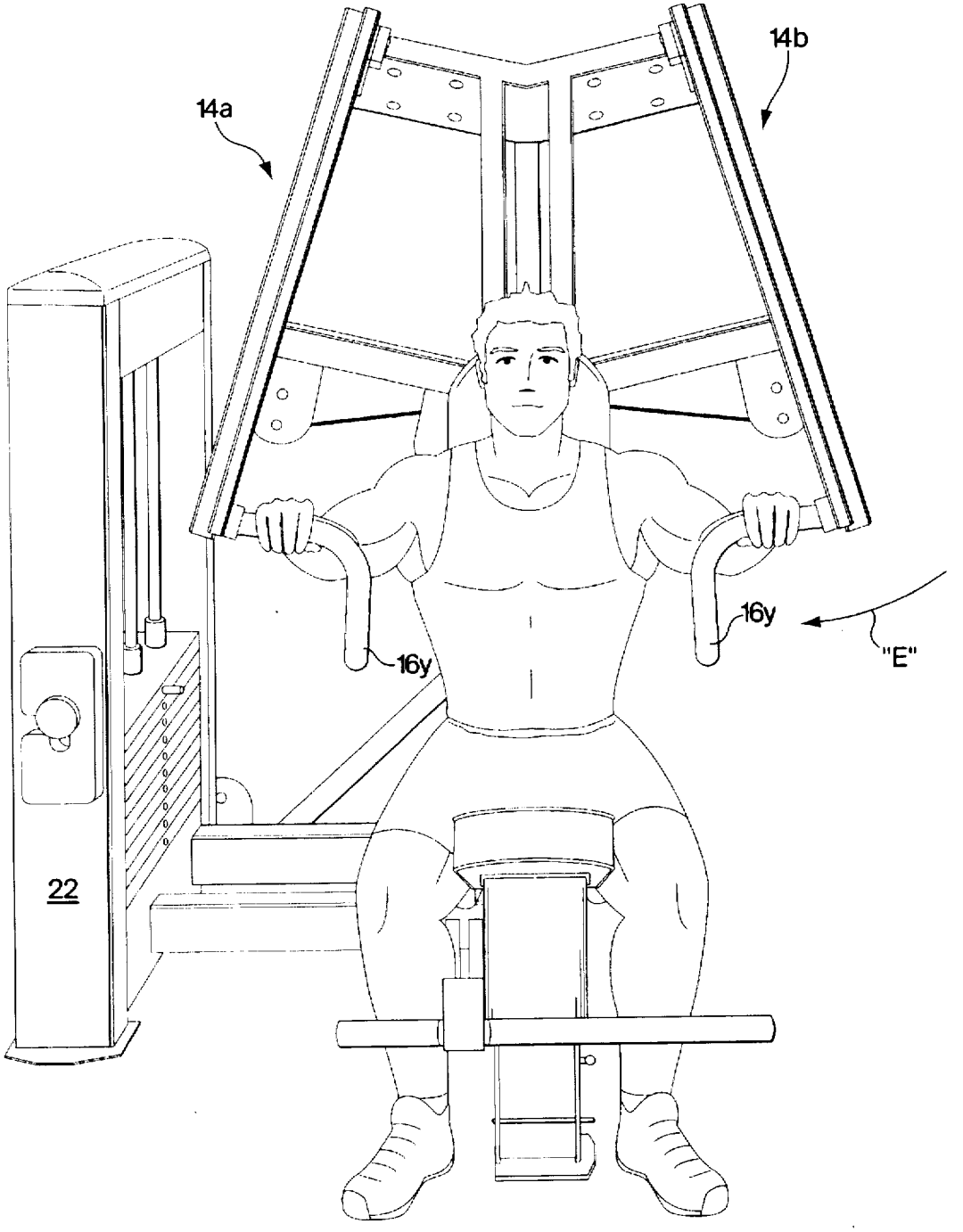


Fig. 8



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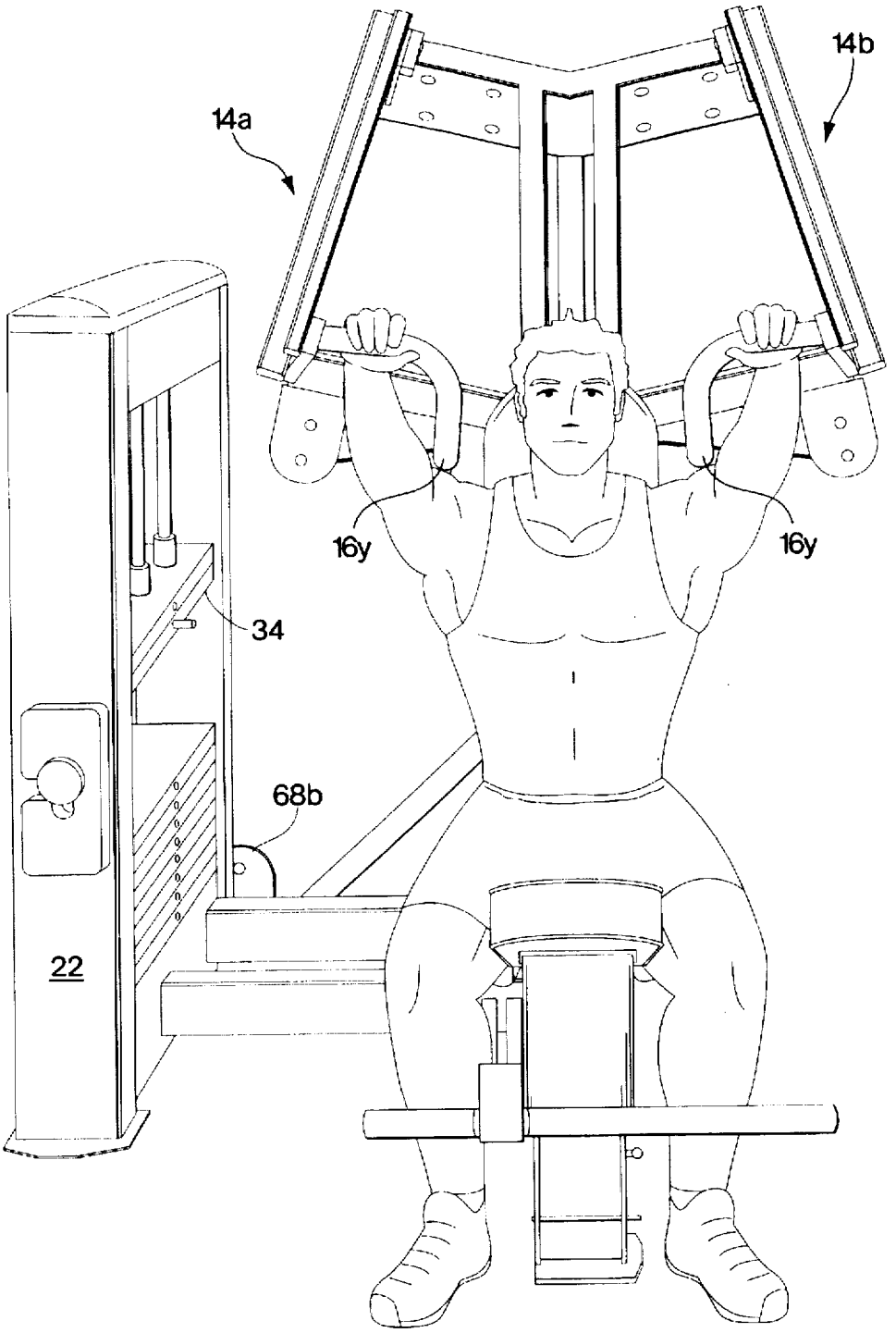


Fig. 10

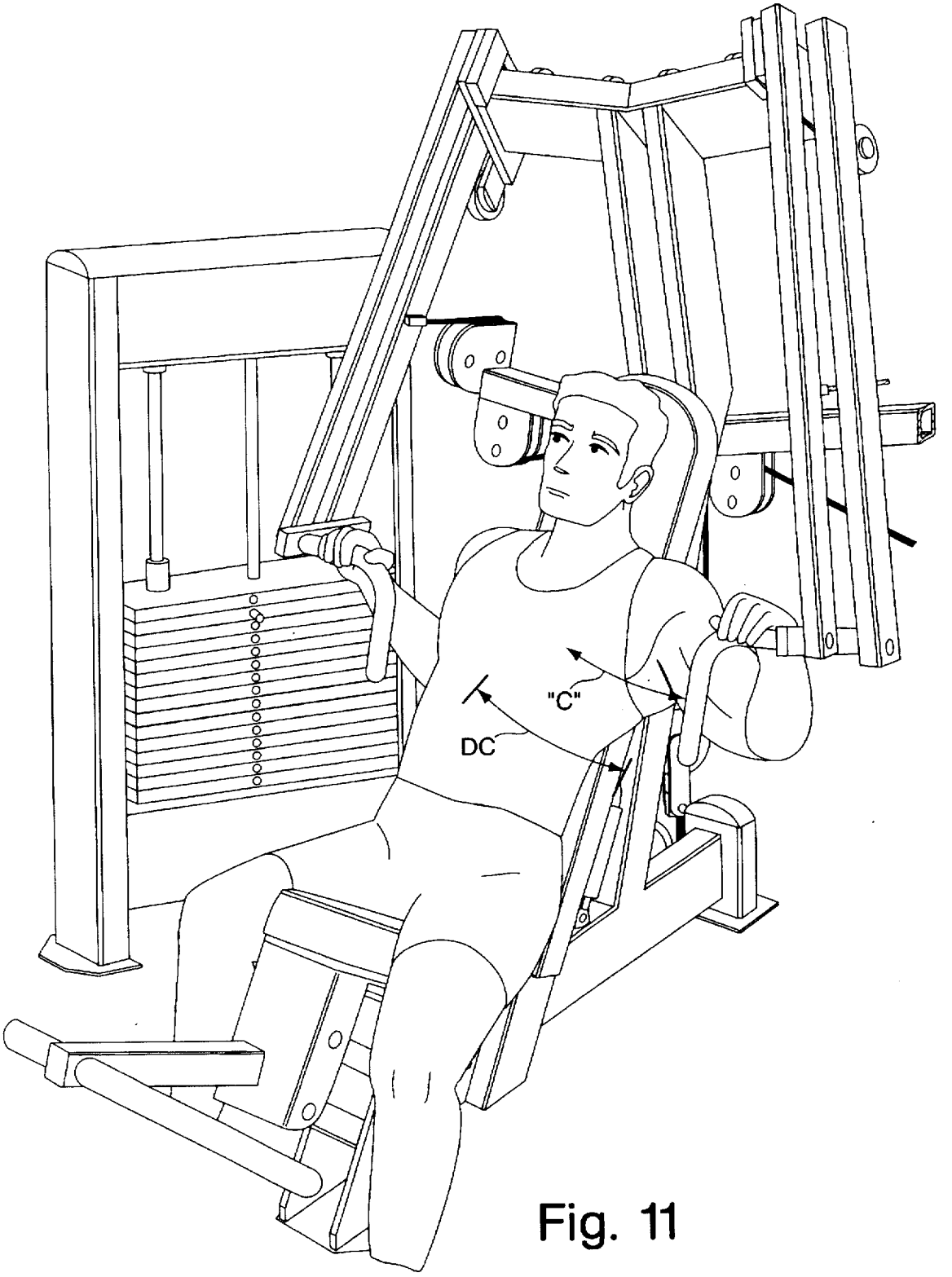


Fig. 11

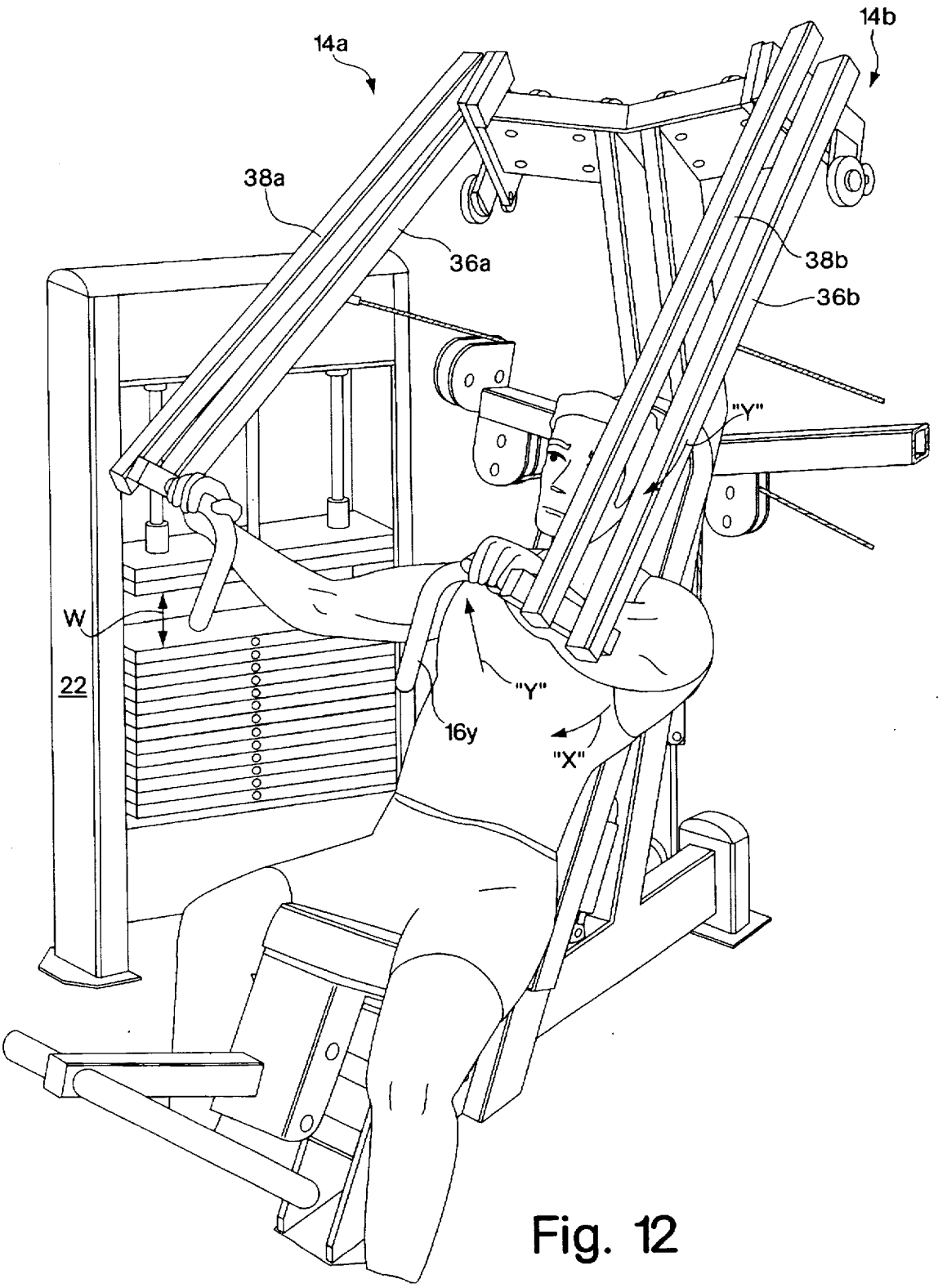


Fig. 12

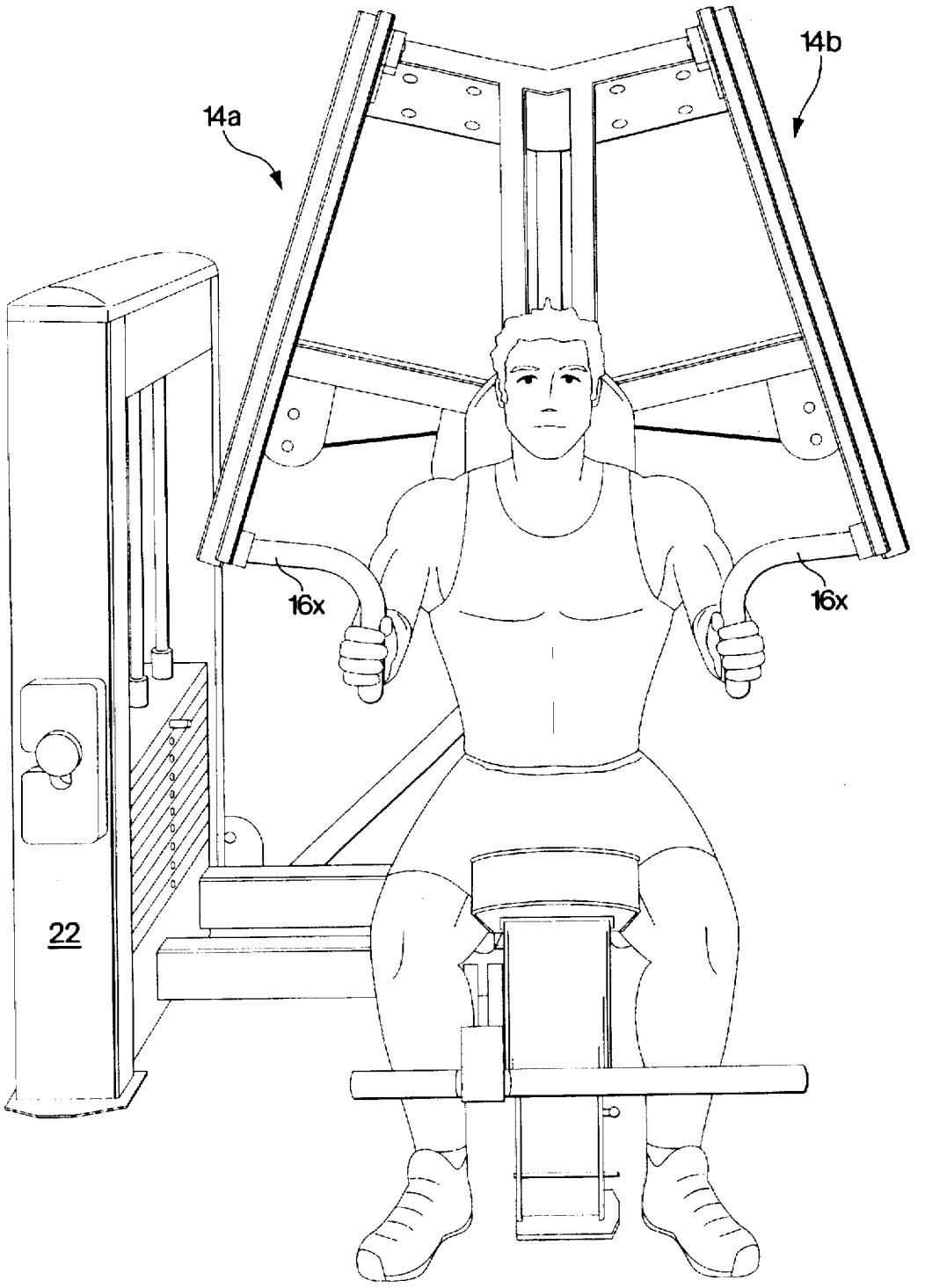
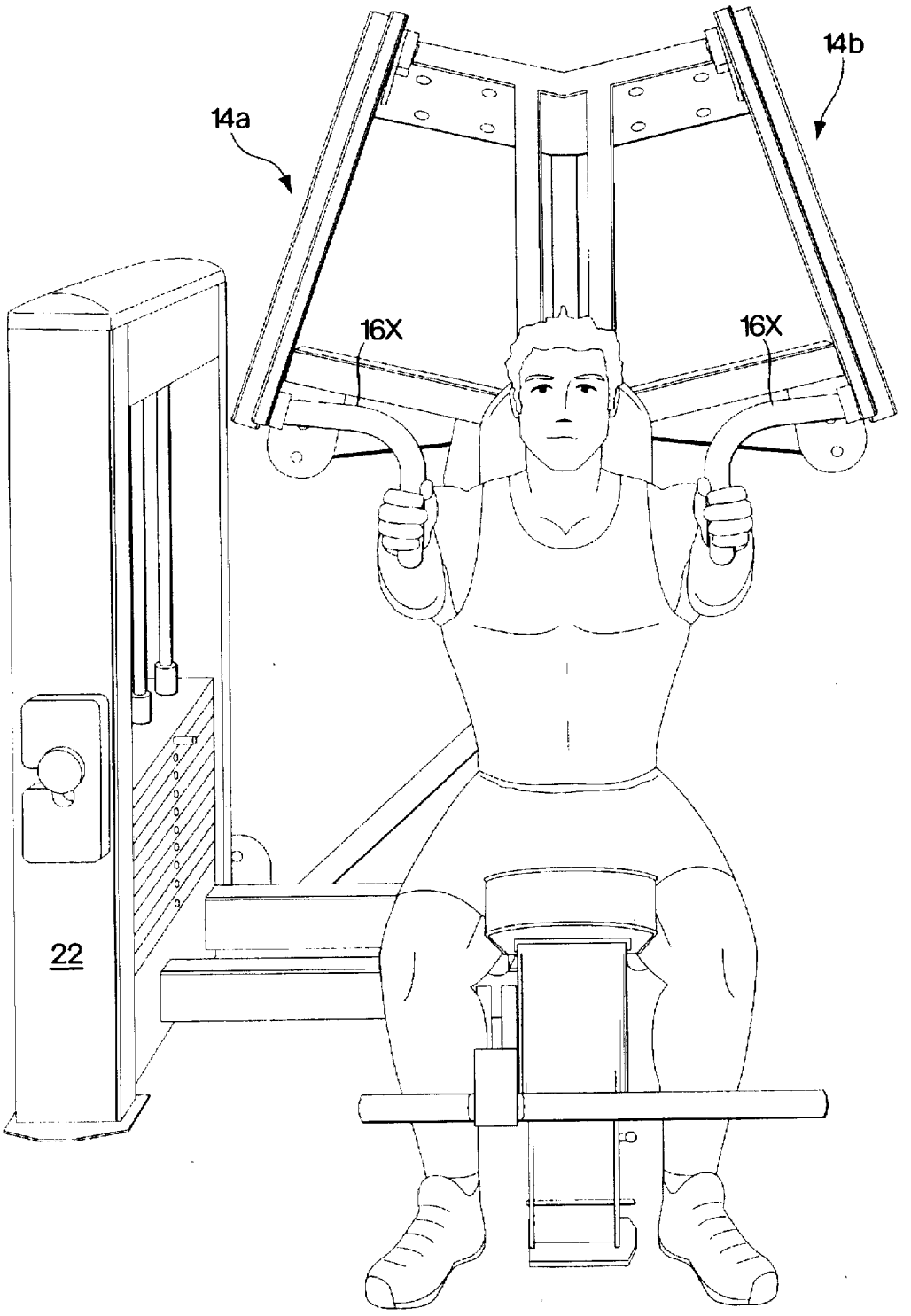


Fig. 13



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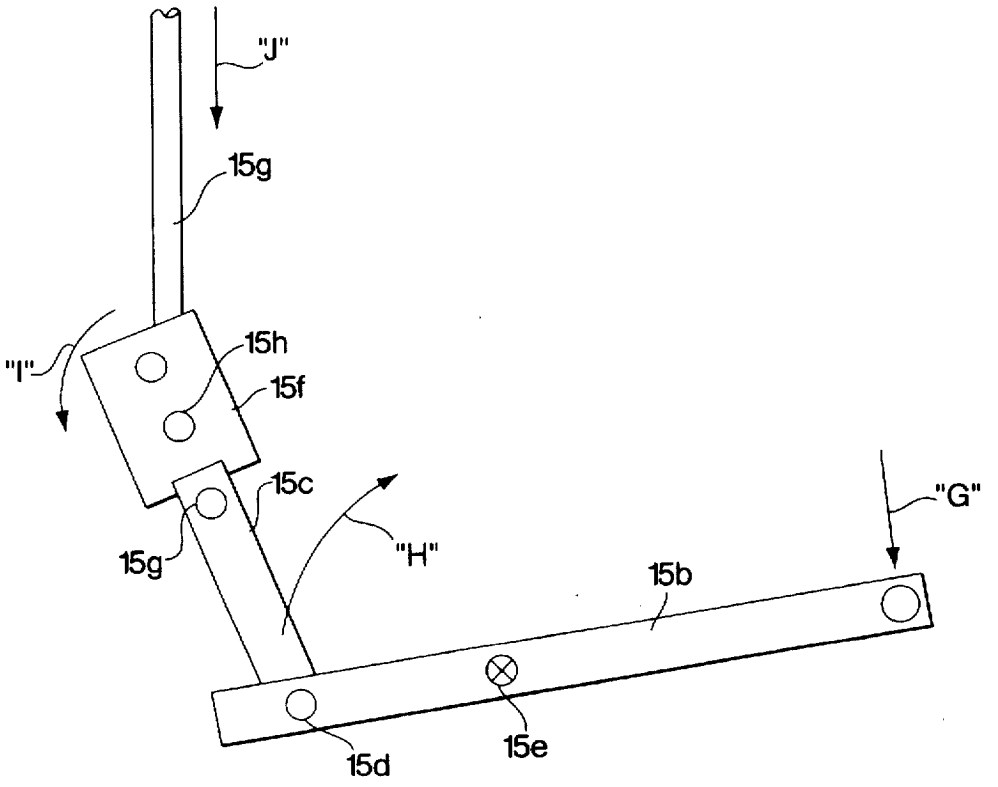
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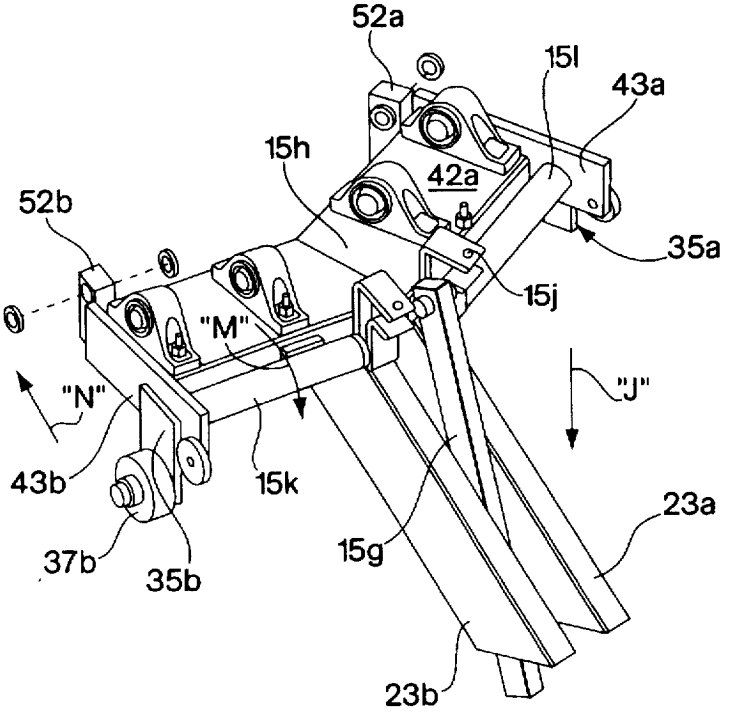
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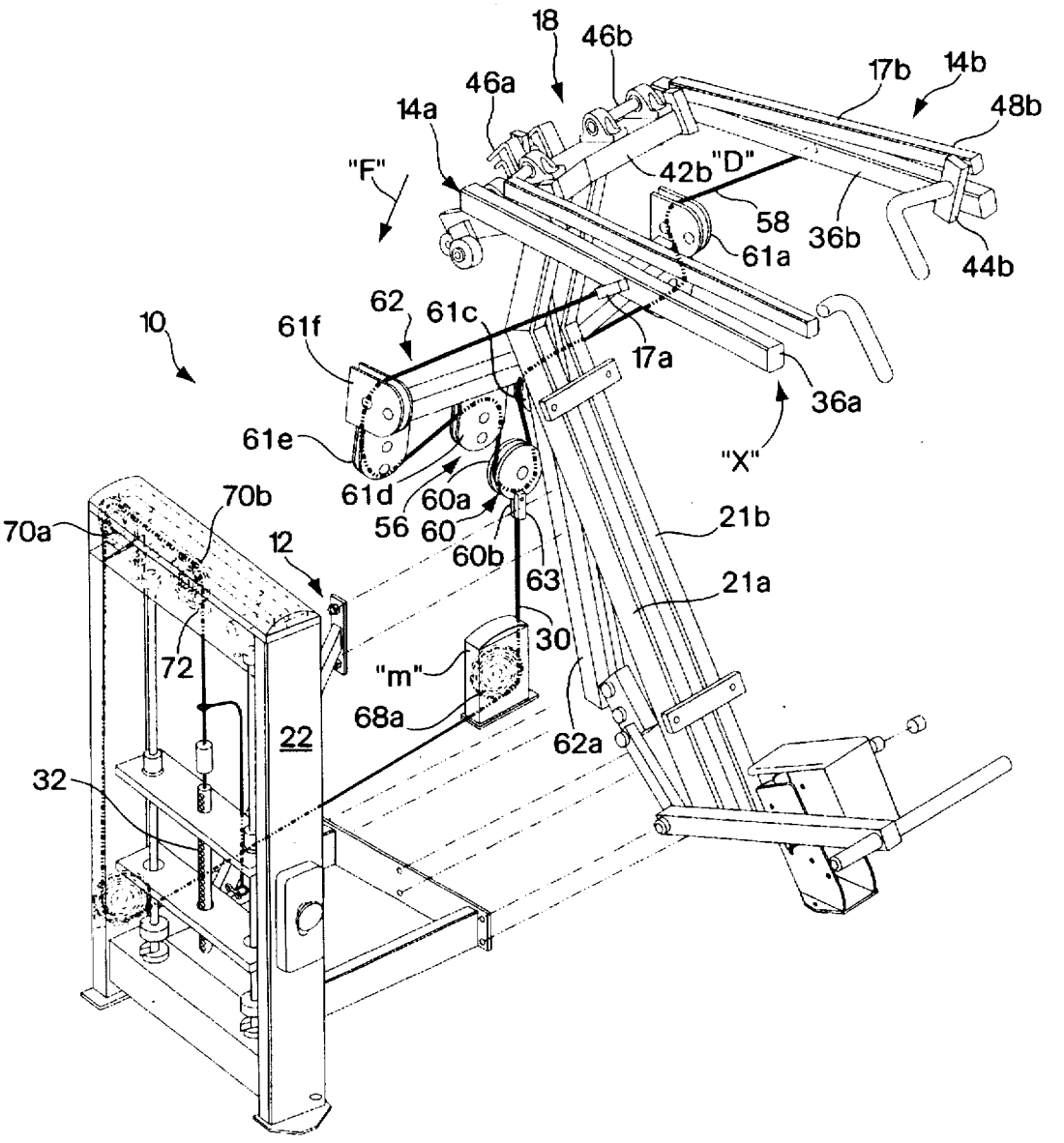
Fig. 16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62a
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Fig. 17

CHEST PRESS APPARATUS FOR EXERCISING REGIONS OF THE UPPER BODY

RELATED APPLICATIONS

This application claims priority under 35 U.S.C.§ 119 (e) to commonly-owned, co-pending U.S. provisional patent application Ser. No. 60/025,529 entitled "Chest Press Apparatus for Exercising Regions of the Upper Body", filed Sep. 30, 1996 by Giannelli et al., which is incorporated herein by reference in its entirety.

BACKGROUND

1. Field of the Invention

The present invention relates to an apparati for exercising regions of the upper body, and more particularly to an improved chest press exercise machine.

2. Background of the Invention

A variety of exercise machines which utilize resistance or strength training have become very popular in recent years. Such strength machines are often used in place of conventional free weights to exercise a variety of muscles within the human body. Most strength machines are designed with the goal of optimizing resistance training benefits to the user by combining adjustable weight resistance with ease of use, while also attempting to maintain proper biomechanical alignment of the user's joints.

While such machines offer convenience and other benefits to the user in comparison to free weights, conventional designs typically include a frame superstructure for providing symmetrical balance and support for various levers and weight components of the machines. Such conventional frame superstructures generally result in machines that are oversized in height, width, and architecture. In addition, many of such conventional machines may be inconvenient to users performing more than one repetition of an exercise with varying weights, as the user is generally required to be physically removed from the machine in order to place weights on, or otherwise select the desired weight force before performing each set.

Another limitation found in conventional strength machines utilizing selectable weights is the inability of the user to perform high velocity exercises. In such conventional machines the weights have inertial problems at higher speeds which can result in inconsistent resistance through a complete range of motion, therefore, users are encouraged to perform the exercises slowly. Training at lower velocities produces greater increases in muscular force at slow speeds for the user. Therefore, low velocity training only improves an individual's capabilities at slower speeds. In contrast, training at higher contractal velocities produces increases in an individual's muscular force at all speeds of contraction at and below the training velocity. Therefore, high velocity training improves an individual's functional capabilities at normal contractal velocities, i.e. velocities utilized for activities such as golfing and tennis which are more likely to be a part of every day living. Although there are many forms of strength training which allow for higher velocity training, the resistance mechanisms of such equipment generally do not include selectable weights, these devices do not utilize selectable weights as part of their resistance mechanism, and many users prefer training with selectable weights as opposed to other forms of resistance training, for example, resistance bands.

Conventional resistance equipment may also be limited by designs that prevent users from maintaining the proper biomechanical alignment of joints through a complete range of motion. A variety of machines have been proposed to improve the range of motion of the user, in order to make the exercise performed through the range more effective. Such machines are disclosed in, but not limited to, U.S. Pat. Nos. 5,437,589 and 5,273,504. However, the equipment disclosed in such references does not consistently provide proper biomechanical alignment of the user's joints through the complete range of motion.

Therefore, a need exists in the field of resistance training for selectable weight equipment that allows users to maintain the proper biomechanical alignment of joints through a complete range of motion, while performing exercises at high contractal velocities.

SUMMARY

In accordance with the invention there is provided a chest press exercise apparatus comprising a selectable weight mechanism and a support mechanism which pivotally supports a pair of four-bar linkage mechanisms. The selectable weight mechanism is disposed in an off-center position relative to the exercise ready seating position of the user, such that the user can readily access and manually adjust/select the degree of weight force from a seated, exercise ready position. The selectable weight mechanism is preferably mounted in a relatively short weight support frame, typically less than about 3.5 feet in height. The four bar linkage mechanisms are pivotally mounted at their rearward ends about axes which are disposed at an angle relative to a horizontal plane, i.e. are tilted relative to vertical, such that a pair of elongated bars of the four bar linkage mechanisms travel in planes which are tilted relative to vertical. A pair of handles are rigidly connected to the forward most bar component of the four-bar linkage mechanisms such that the handles follow the same pivoting movement as the forward most bar component, as the four bar linkage mechanism are pivoted around the rearward mounted, tilted axes. When utilizing a neutral grip the four-bar linkage mechanisms enable the user to maintain the proper biomechanical alignment of the joints. If a horizontal grip is utilized then the tilted axes maintain the proper alignment of the wrists. The tilted planes through which the four bar linkage mechanisms travel enable the handles to travel along a slightly curvilinear outwardly converging path which simulates as natural a human musculoskeletal outward pushing motion as possible. The four bar linkage mechanisms are preferably mounted to an upright support. A cable and pulley are interconnected between the four-bar linkage mechanisms and the shortened selectable weight mechanism such that as the four bar linkage mechanisms are pivoted around their corresponding primary axis the selected weight is pulled through a relatively short vertical path, preferably about 1 foot. The distance between the point where the cables are connected to the four bar linkage mechanisms and the forward most bar of the four bar linkage mechanisms to which the handles are connected is such that the user has increased leverage control over the pulling of the selected weight resistance.

Accordingly, the present invention is directed to a chest press exercise apparatus that includes a base member and a support member extending from the base member. A pair of four-bar linkage mechanisms are supported by the support member. Each of the pair of four-bar linkage mechanisms includes a primary lever arm pivotable about a primary axis and a follower lever arm pivotable about a secondary axis. The primary axes are disposed at an angle with respect to each other. The primary and follower lever arms lie in a common plane tilted at an angle relative to a vertical plane,

which vertical plane is perpendicular to a horizontal plane underlying the base member. The apparatus also includes a weight mechanism operatively associated with the pair of four-bar linkage mechanisms. The primary and follower lever arms travel in the common plane as the pair of four-bar linkage mechanisms are displaced between a first position and a second position while maintaining a correct biomechanical positioning of the user.

In another aspect of the invention, the chest press exercise apparatus includes a handle lever arm operatively associated with both of the primary and follower arms of each of the pair of four-bar linkage mechanisms. A handle extends from each handle lever arms, each handle extending outwardly and perpendicularly from the handle lever arm, and curving outwardly and downwardly therefrom at a 90 degree angle. The handles travel in a slightly curvilinear upwardly converging and downwardly diverging path as the four-bar linkage mechanisms are displaced between a first position and a second position, while maintaining the correct biomechanical positioning of the user.

In another aspect of the present invention, the support member includes at least one post member connected to the base member extending upwardly behind a seat. The first and second four-bar linkage mechanisms are supported on the at least one post member above and behind the seat. The primary and follower lever arms travel in the common plane as the four-bar linkage mechanisms are displaced between a first position and a second position.

In another aspect of the invention, the first and second four-bar linkage mechanisms each have a length, and are each pivotally supported at a first selected position along the length, each having a handle connected to a second selected position along the length. The apparatus includes a seat which positions a user in a disposition relative to the handles such that the handles are manually engageable by the user for pushing the handles between the first position and the second position in a chest press motion.

In another aspect of the invention, the chest press exercise apparatus includes a handle lever arm operatively associated with each of the primary and follower lever arms. The handle lever arm includes a manually engageable handle for moving the four-bar linkage mechanisms between the first and second positions. The handle is disposed in a predetermined gripping orientation in the starting position such that the operative association of the handle lever arm with the primary and follower arms maintains the handle extension in the predetermined gripping orientation during displacement of the four-bar linkage arms between the first and second positions.

In another aspect of the invention, at least one of the primary and follower lever arms of each of the four-bar linkage mechanisms is operatively associated with a cable and a selected portion of a selectable weight stack. The selected portion of the weight stack is displaced by a distance upon movement of the four-bar linkage arms from a first position to a second position.

In another aspect of the invention, the primary and follower lever arms each have a length, and a handle interconnected to a first position along the length of at least one of the four-bar linkage mechanisms. The cable is interconnected to a second position along the length of at least one of the four-bar linkage mechanisms. The first and second interconnection positions of the handle and the cable are selected such that the handle travels through a distance less than about 60% of the displacement distance of the selected portion of the weight stack upon displacement of the four-bar linkage mechanisms from a first position to a second position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front-right perspective view of a chest press exercise apparatus according to the invention;

FIG. **2** is a front view of the FIG. **1** apparatus showing the laterally connected weight stack in a semi-perspective disposition;

FIG. **3** is a left-front perspective view of the FIG. **1** apparatus showing a detail close-up of the control support bar relative to the user seat;

FIG. **4** is a right-front perspective view of the FIG. **1** apparatus showing a detail of the interconnection of cables to the four-bar linkage arms;

FIG. **5** is a front-right perspective view of the FIG. **1** apparatus showing a user seated in an exercise chest press ready position;

FIG. **6** is a perspective view of the pivotally mounted portion of one of the pair of four-bar linkage arms of the FIG. **1** apparatus;

FIG. **7** is a right side view of the rear-upper portion of the FIG. **1** apparatus showing the tilted pivot axis mounting of one of the four-bar linkage arms to the central support bar member of the FIG. **1** apparatus;

FIG. **8** is a left side view of the rear-upper portion of the FIG. **1** apparatus showing the tilted pivot axis mounting of one of the four-bar linkage arms to the central support bar member of the FIG. **1** apparatus;

FIG. **9** is a front view of the FIG. **1** apparatus showing a user seated in and grasping a horizontal extension of the handle bars of the FIG. **1** apparatus in a starting chest press exercise position;

FIG. **10** is a front view of the FIG. **1** apparatus showing a user seated in and grasping a horizontal extension of the handle bars of the apparatus in a second extended four-bar linkage arm pivoted position;

FIG. **11** is a left-side perspective view of the FIG. **9** view;

FIG. **12** is a left-side perspective view of the FIG. **10** view;

FIG. **13** is a front view of the FIG. **1** apparatus showing a user seated in and grasping a vertical extension of the handle bars of the FIG. **1** apparatus in a starting chest press exercise position;

FIG. **14** is a front view of the FIG. **1** apparatus showing a user seated in and is grasping a vertical extension of the handle bars of the apparatus in a second extended four-bar linkage arm pivoted position;

FIG. **15** is a side schematic view of an arrangement of interconnected levers which interconnect a foot pedal to the pivotable four-bar linkage arms for initially positioning the four-bar linkage arms;

FIG. **16** is a top right-side perspective view of the upper-side of the central support bar of the FIG. **1** apparatus showing the pivot mounting brackets and pivot wheel stop mechanisms;

FIG. **17** is an upper right-side perspective view of the FIG. **1** apparatus without the seat and base components showing the four-bar linkage arms in an extended pivoted position and showing the interconnection and positioning of the cable and pulleys between the four-bar linkage arms and weight stack.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring initially to FIGS. **1**, **2**, and **17**, there is illustrated a perspective and a front view of a chest press exercise

machine **10**, according to one embodiment of the present invention. Chest press exercise machine **10** preferably includes a support **18** for supporting a pair of four-bar linkage mechanisms **14***a* and **14***b* as well as for supporting a seat **20**, a selectable weight mechanism **12** operatively connected to each of the pair of four bar linkages **14***a* and **14***b*, and a pair of handles **16***a* and **16***b* extending from the four bar linkages **14***a* and **14***b*, respectively. For purposes of the present description, reference signs with the "b" suffix designate mirror images of those with an "a" suffix.

In the present embodiment, support **18** is preferably constructed of a rigid material such as steel, and includes a base member **19**, a pair of post members **21***a* and **21***b* (FIG. **17**), a cross bar assembly **62**, and a pair of extensions **23***a* and **23***b*, all of which combine to form the structural elements of support **18**. Base member **19** preferably includes a first support member **19***a*, a second support member **19***b* and a mounting member **19***c* disposed therebetween. First and second support members **19***a* and **19***b* preferably rest on a substantially horizontal, flat surface, such as the floor **17**. Preferably a foot start **15** is located adjacent first support member **19***a* so that a user can easily grasp handles **16***a* and **16***b* in order to begin exercising, as described in greater detail herein below. In the present embodiment mounting member **19***c* is preferably supported at one end by first support member **19***a*, is supported at an opposite end by second support member **19***b*, and is preferably spaced from and substantially parallel to the floor **17**.

With continued reference to FIGS. **1**, **2**, and **17**, post members **21***a* and **21***b* preferably extend at an angle, which is approximately 30° from vertical axis "v" (FIG. **2**) in the present embodiment, and operate to support seat **20** in a reclined position. Cross bar assembly **62** preferably includes a mounting post **62***a* and a pair of cross bar members **62***b* and **62***c* mounted transverse to and preferably at an angle with respect to mounting post **62***a*. Extensions **23***a* and **23***b* are preferably mounted to and extend from post members **21***a* and **21***b*, respectively. In the present embodiment, extensions **23***a* and **23***b* extend from post members **21***a* and **21***b* at an angle which is inclined toward the forward facing direction of the user. It will be understood to one of skill in the art that any number of structural elements, having a variety of shapes, sizes and orientations, may be utilized to form support **18**, as long as the structural orientation supports the four bar linkages as the user exercises against a selected resistance.

Referring again to FIG. **1**, seat **20** preferably includes a seat cushion **25** and a support cushion **27**, is supported in a reclined position, and is preferably adjustable between a plurality of vertical positions. Seat cushion **25** is supported by an angled seat mount **29** while support cushion **27** is supported by angled post members **21***a* and **21***b*. Seat **20** is mounted at an angle, which is approximately 30° in the present embodiment, with respect to a plane perpendicular to floor **17**, so as to properly orientate the user for performance of a chest press exercise motion. In the present embodiment, adjustment of seat **20** is preferably enabled through a four-bar, gas-assist seat adjustment, although other methods of adjustment, for example hydraulic, may be utilized. A pin **33** is insertable through each of a plurality of holes, in order to select the desired height of the seat. As with support **18**, seat **20** may be designed in a variety of configurations and dimensions, and may, or may not be adjustable.

Referring to FIGS. **1**, **15**, and **16**, foot start **15** is preferably located adjacent seat **20**, and when activated by a user, allows the user to easily grasp handles **16***a* and **16***b* in order to begin exercising, as is known in the art. Foot start **15** preferably includes an engagement rod **15***a* mounted to a first, forward end of assist lever **15***b* such that engagement of rod **15***a* by a user in the direction of arrow "G" moves the first end of assist lever also in the direction of arrow "G". Assist lever **15***b* is connected at a second end, opposite the first end, to one end of linkage **15***c*, by pin **15***d*, such that upon engagement of rod **15***a* by the user in the direction of arrow "G", linkage **15***c* moves in the direction indicated by arrow "H". Assist lever **15***b* is further connected to support **18** by pivot **15***e*. Linkage **15***c* is, in turn, connected an opposite end to center link **15***f* by pin **15***g*, such that movement of linkage **15***c* in the direction of arrow "H" pivots center link **15***f* in the direction indicated by arrow "I". Center link **15***f* is connected to support **18** by rod **15***h*, and is connected at a second end to bar **15***g*, such that pivoting center link **15***f* in the direction of arrow "I", moves bar **15***g* in a downward direction as indicated by arrow "J". The movement of rod **15***g* in the direction of arrow "J" moves rockers **15***i* and **15***j* and hence axes **15***k* and **151** which are connected thereto, in the direction of arrow "M". Axes **15***k* and **151** are, in turn, rotationally connected to corresponding stop arms **35***a* and **35***b* mounted thereto, with rollers **37***a* and **37***b* of stop arms **35***a* and **35***b* abutting corresponding primary lever arms **36***a* and **36***b* (FIGS. **4** and **6**). Movement of axes **15***k* and **151** therefore moves stop arms **35***a* and **35***b*, and rollers **37***a* and **37***b*, in the direction of arrow "N" to move the four bar linkages **14***a* and **14***b* toward the user until the user is able to grip the handles **16***a* and **16***b*.

With continued reference to FIGS. **1** and **2**, selectable weight mechanism **12** is preferably a high-mass, short-travel (HMST) weight stack. The high-mass, short-travel weight mechanism **12** provides the user with a higher mass weight stack and a shorter range of travel than conventional weight stacks. By increasing the mass and decreasing the range of travel, the speed of the selected weight is decreased during use, without slowing down the speed of the user, as described hereinbelow. This allows an individual to utilize strength training to train at higher contractal velocities s without the associated negative inertial effect found in conventional selectable weights, because as the speed of the weight is decreased, so is the negative inertial effect. Overcoming the negative inertial effect, in turn, results in smooth and predictable resistance through a complete range of motion.

As shown in FIGS. **2** and **5**, selectable weight mechanism **12** is preferably disposed in an off-center position relative to the exercise ready, seating position of the user such that the user can readily access and manually adjust/select the degree of weight force from a seated, exercise ready position. In the present embodiment, weight mechanism **12** stands approximately **35** inches in height and preferably includes a housing **22** and a plurality of selectable weight plates **24** supported therein. Housing **22** is preferably supported by a stabilizer bar **22***a* and brace **22***b* which are both attached to support **18**. The total number of selectable weight plates **24** supported within housing **22** are referred to collectively as a "weight stack." In the present embodiment, weight plates **24** are each approximately 0.75 inches thick and are uniform in weight, each plate weighing approximately 20 lbs. A top weight plate **28** is operatively connected to a cable **30** and a central rod **32**. The central rod **32** extends in a downward direction from top weight plate **28** through each of the consecutive weight plates **24**. A pin **34** (FIG. **10**) is insertable through a transverse hole in each plate, and into the central rod to select the desired amount of weight for the exercise routine to be performed, as is known in the art. Weights **24** are

movable in a first and second substantially vertical direction along guide rods **26***a* and **26***b*, respectively, as will be described in greater detail herein below.

With reference to FIG. **12**, in the present embodiment, the selectable weight plates **24** preferably have a total mass of 400 lbs, which is twice the conventional mass (200 lbs) utilized with a chest press machine. Also in the present embodiment, the selected weight plates **24** travel at approximately half the speed of a selected weight plate of a conventional chest press machine, therefore, the selected weight also is subjected to approximately half the acceleration over approximately half the distance of a conventional selected weight plate utilized with a chest press machine. As shown in FIGS. **11** and **12**, the distance "W" that the selected weight plates travel is approximately 55% of the distance "DC" traveled by a user's hand, in the present embodiment, as measured by the distance between the vertical positions of handles **16***a* and **16***b* at the start and stop of the exercise. The distance "DC" is a function of the length of the user's arm. The distance a user's hand travels from the beginning to the end of one repetition of the exercise defines a complete range of motion. Although the mass is doubled, the total load the user feels during the performance of an exercise routine is the same as with a conventional chest press machine. This effect is achieved by changing the mechanical advantage to increase the leverage the user has over the selected weight plates from 1.8:1 (force exerted by user:weight) in a conventional system, to a 0.9:1 ratio in the present embodiment. The ratio may be changed by attaching cable **58** (FIG. **17**) at an appropriate attachment point along primary lever arm **36***a* and **36***b*, in the present embodiment, as determined by conventional engineering techniques.

Referring now to FIGS. **4**, **6**, and **17**, pulley blocks **17***a* and **17***b* preferably attach cable **58** at a point approximately mid-way between first pivot points **44***a* and **44***b* and second pivot points **46***a* and **46***b* of primary lever arms **36***a* and **36***b*, respectively. Pulley blocks **17***a* and **17***b* are attached at approximately 55% of the distance between first pivot points **44***a* and **44***b* and second pivot points **46***a* and **46***b*, as measured starting from the second pivot points **46***a* and **46***b*, in the present embodiment. The total distance between the pivot points is in the range of approximately 25 to 35 inches, and is approximately 30.5 inches in length in the present embodiment. It should be understood that the placement of cable **58** depends upon the desired leverage, and the desired leverage depends upon the percentage increase in the mass of the weights, as compared to conventional weights. The criteria for determining the placement of cable **58** is that while performing an exercise on the chest press exercise apparatus of the present invention, the user should feel a resistance comparable to that felt while performing an exercise on a conventional chest press exercise apparatus while being able to exercise at higher contractal velocities. The increase in mass is, in turn, determined by several considerations, such as cost, structural load placed on the apparatus by the mass, as well as the ability to readily achieve the desired leverage for a given mass.

With reference to FIGS. **1**, **2** and **4**, four bar linkage mechanisms **14***a* and **14***b* having a length "L", are pivotally mounted at their rearward ends to support **18**, and are operatively associated with the selectable weight mechanism **12**, as will be described in greater detail herein below. Four bar linkages **14***a* and **14***b* are symmetrical in construction, therefore, the below detailed description of linkage **14***a* is applicable to symmetrical linkage **14***b* as well. Four bar linkage **14***a* preferably includes primary lever arm **36***a*, a follower lever arm **38***a*, a handle lever arm **40***a*, and a support arm **42***a*. Preferably, the primary and follower lever arms lie and travel in a common plane which is tilted at an angle relative to a vertical plane, where the vertical plane is perpendicular to horizontal plane "A" underlying the base **19** of the apparatus. In the present embodiment, for ease of illustration, the tilted common plane is illustrated as plane "T" (FIG. **1**), which is tilted with respect to the vertical plane "Z", where plane "Z" intersects the y- axis, and is perpendicular to plane "A", and where the y- axis bisects the seat **27**. Although the common titled plane "T" is illustrated with reference to the vertical plane "Z", any vertical may be used as a reference plane for the angular disposition of the four-bar linkages, provided such plane is perpendicular to the horizontal plane "A" underlying the apparatus, and on which it is supported, such as, for example, plane "B".

The primary lever arm **36***a* is preferably an elongated bar which is pivotally connected at a first, forward end to the handle lever arms **40***a*, by a pin **44***a* (FIG. **7**) and is pivotally connected at second, rearward end, opposite the first end, by primary axle **46***a* (FIG. **6**), which is axially disposed about primary axis **47***a* (FIG. **4**). The primary axle **46***a* is, in turn, mounted to the support arm **42***a*. In the present embodiment, the support arm **42***a* preferably includes a plate **43***a*, having a stop arm **35***a* mounted thereto. The stop arm **35***a* includes a roller **37***a* which engages primary lever arm **36***a* when the machine **10** is not in use, limits the downward movement of four bar linkages **14***a* and *b* in the direction of arrow "E", and assists in the grasping of handles **16***a* and **16***b*, as described hereinabove.

Follower lever arm **38***a* is likewise preferably an elongated bar which is pivotally connected at one end to handle lever arm **40***a* at a first pivot point **48***a*, by any suitable fastening device, such as a bolt, and is pivotally connected at its opposite, rearward end by secondary axle **50***a* (FIG. **4**), which is axially disposed about secondary axis **51***a*. The secondary axle **50***a* is, in turn, mounted to the support arm **42***a*. The distance between the first pivot point **48***a* and the second pivot point **50***a* of follower lever arm is preferably equal to the distance between the pivot points of the primary lever arm. In the present embodiment the distance between pivot points **48***a* and **50***a* of follower lever arm is approximately 30.5 inches, although alternate lengths are acceptable for both the primary and follower lever arms. In the present embodiment, the distance between primary axle **46***a* and secondary axle **50***a* is 3.75 inches. Also in the present embodiment, secondary axle **50***a* is mounted to block **52***a* (FIG. **2**) which is part of support arm **42***a*. Block **52***a* is preferably welded to a support arm **42***a*, but may be attached in any suitable manner as long as block **52***a* remains stationary while supporting follower lever arm **38***a*. Alternatively, secondary axle **50***a* may be directly mounted to support arm **42***a*.

In the present embodiment, the primary axes **47***a* and **47***b* are preferably disposed at an angle with respect to a horizontal plane "A" underlying machine **10**. Angle θ is the angle disposed between the angled primary axes **47***a* and **47***b* and is in the range of 135 to 165 degrees, and is preferably 150 degrees for a chest press machine according to the present embodiment. The primary concern with regard to the angle θ is that convergence take place in the upward, or pushing direction. In determining the preferred angle employed, several considerations are taken into account, including, but not limited to, the starting and ending points of a handles **16***a* and **16***b* (FIG. **1**), which allows the correct biomechanical positioning of the user's wrists and forearms to be maintained. "Proper" or "correct biomechanical positioning," as used herein, means that the orientation of

the user's wrist and forearm remains relatively constant from the start to finish of a chest press exercise motion, i.e., throughout a complete range of motion. This may also mean that it is not necessary for the user to adjust their hand position on the handles while exercising, since the handles do not twist, as in conventional exercise machines. These points help determine the maximum angle θ, or in other terms, the maximum upward convergence of the four bar linkages **14***a* and **14***b*. In the present embodiment, the secondary axles **50***a* and **50***b* are preferably spaced from and are parallel to the primary axles **46***a* and **46***b*. The primary axes **47***a* and **47***b* are also preferably disposed parallel with respect to a plane "B", plane "B" being perpendicular to horizontal plane "A" (FIG. **2**).

With continuing reference to FIGS. **1** and **2**, the handle lever arm **40***a* is the forward most component of the four bar linkage **14***a*. The handle lever arm **40***a* is approximately 4.5 inches in length between the pivot points **44***a* and **48***a* includes a handle **16***a* extending therefrom. In the present embodiment, the follower lever arm **38***a* is preferably not disposed parallel with respect to primary lever arm **36***a*. The handle **16***a* is preferably rigidly connected to the handle lever arm **40***a*, and preferably includes a first handle portion **16***x* extending in a first, perpendicular direction therefrom, and a second handle portion **16***y* curving outwardly from the first portion **16***x*, preferably at a 90° angle, and preferably slightly downwardly. Such an arrangement enables a slight rotational movement of the bottom end **41***a* of the handle lever arm **40***a* in the direction of arrow "y" during operation, resulting in a slight tilt of the handle **16***a* through the complete range of motion. Such a slight tilt of the handle assists the user in maintaining the proper biomechanical alignment of the user's wrist and forearm during performance of the exercise, as previously described. The handle **16***a* is preferably rigidly connected to the handle lever arm **40***a*, extends in a first, perpendicular direction therefrom, curves outwardly, preferably at a 90° angle, and preferably slightly downwardly. With such an arrangement, a user may choose either a grip which is perpendicular or substantially parallel to the handle lever arm **40***a*, also known as horizontal or neutral grips, respectively. When a horizontal grip is used, i.e. when the user grasps handle portions **16***x* so that their hands are substantially perpendicular to the handle lever arm **40***a*, as shown in FIGS. **7** and **8**, then the tilted axes maintain the correct biomechanical alignment of the wrists. When a neutral grip is used, i.e., when the user grasps handle portions **16***y* so that their hands are substantially parallel to handle lever arm **40***a*, as shown in FIGS. **9** and **10**, the four-bar linkage mechanisms also enable the user to maintain the correct biomechanical alignment of the joints. In either case, the handle does not substantially twist or change orientation relative to the horizontal (A) and vertical (Z and B) planes throughout the user's complete range of motion, i.e., displacement of the four-bar linkage mechanisms. Alternatively, the handle **16***a* may extend at any orientation with respect to the handle lever arm **40***a*, provided the orientation allows the user to comfortably grip the handle while preferably properly aligning the user's hands with respect to the user's wrists. In the present embodiment the handle **16***a* is welded to the handle lever arm **40***a*, although other attachment methods may be utilized provided that the handle **16***a* remains substantially stationary with respect to the handle lever arm **40***a*. The handle **16***a* is also preferably covered with foam for user comfort.

Referring now to FIG. **17**, pulley system **56** preferably includes a cable **58** attached at a first end to primary lever arm **36***a* and attached at a second end to primary lever arm **36***b*. In the present embodiment, the cable **58** is preferably attached by pivot blocks **17***a* and **17***b* to both of the primary lever arms **36***a* and **36***b*, respectively. As previously discussed, the cable **58** is attached at approximately 55% of the distance between the first pivot points **46***a* and **46***b* to the second pivot points **44***a* and **44***b*, respectively, as measured starting from the second pivot points **46***a* and **46***b*, in order to increase the mechanical advantage the user has over the weight to be lifted.

In order to effectuate movement of the selected weight by actuation of either, or both four bar linkages, cable **58** is routed from primary lever arm **36***a*, through a plurality of secondary pulleys **61***a*, **61***b*, and **61***c*, respectively, and through floating pulley **60**. From floating pulley **60**, the cable **58** is routed through a plurality of secondary pulleys **61***d*, **61***e*, and **61***f* for attachment to primary lever arm **36***b*. Secondary pulleys **61***a* through **61***f* operate to route the cable from attachment to the four linkages to the floating pulley **60** in an unobtrusive manner which is easy to access for replacement or repairs, while not interfering with the exercise motions of the user. It will be understood to those skilled in the art that because pulleys **61***a* through **61***f* are utilized to route the cable **58** to the floating pulley **60**, any number of pulleys may be utilized in a variety of orientations, as long as routing to the floating pulley is achieved.

Floating pulley **60** preferably consists of a pulley **60***a* disposed between two side plates **60***b* and, **60***c*, is connected to a pivot block **63** at one end thereof, and is movable by cable **58** in the direction indicated by arrow M. In operation, a user will begin from a starting position, as shown in FIG. **9**, and push on handles **16***a* and **16***b*, either simultaneously, or one at a time, in an outward direction, indicated by arrow "E". If the handles are pushed on simultaneously, as shown in FIG. **10**, both primary lever arms **36***a* and **36***b* operate to put cable **58** in a state of tension, which in turn puts tension on floating pulley **60**. The tension on pulley **60** is sufficient to move the pulley in the direction of arrow M, from an initial, at rest position, to a second, active position. Alternatively, if the user chooses to push on only one handle at a time, for example, handle **16***b*, then the cable is initially moved in the direction of arrow "D" (FIG. **17**), as described below.

Movement of handle **16***b*, and hence, cable **58** in the direction indicated by arrow "D" places tension on the cable, and the tension on the cable is initially transferred to primary lever arm **36***a*. During movement of handle **16***b*, handle **16***a* is preferably still grasped by the user. Therefore, the force initially transferred to primary lever arm **36***a* will not operate to move the lever arm, as the movement will be resisted by the user's grip on handle **16***a*. Alternatively, if the user does not resist the force from cable **58**, the primary lever arm will move in the direction of arrow "F", until such time as roller **37***a* of stop arm **35***a* abuts primary lever arm **36***a*, as described above. In either case, the force exerted on and through cable **58** will ultimately be transferred through floating pulley **60** and will operate to move pulley **60** in the direction of arrow M, as discussed above. The above description is also applicable to movement of handle **16***a*, with the force being initially transferred to primary lever arm **36***b*. It will be understood to those skilled in the art that since the pulleys are utilized to route the cable **58** to the floating pulley **60**, any number of pulleys may be utilized in a variety of orientations, as long as routing to the floating pulley is achieved.

Floating pulley **60** is attached at one end to cable **30** by pivot block **63**. Movement of floating pulley **60** in the direction of arrow M, therefore, also operates to move cable

30 in the direction of arrow M. As shown in FIG. 1, cable 30 is routed through a pulley 68*a*, and then through pulley 68*b*, attached to the exterior of weight mechanism 12. Cable 30 is then received within housing 22 of weight mechanism 12, where the cable is preferably routed through pulleys 70*a* and 70*b* (FIG. 17). Pulleys 70*a* and 70*b* operate to orientate the cable above the plurality of selectable weights 24, disposed within housing 22. Cable 30 exits the housing at an aperture 72 where it is operatively connected to central rod 32, as described above. Again, any number of pulleys may be utilized to route cable 30, as long as the cable is operatively connected to central rod 32.

The operation of chest press machine 10 will now be described with reference to FIGS. 1–17. Prior to performance of an exercise routine, a user will first adjust seat 20 to a desired position in which the user's feet will preferably be in contact with floor 17. The user then selects the desired weight for performance of the exercise by inserting pin 34 into the transverse hole of the appropriate weight plate, as described above. Due to the off-center orientation of weight mechanism 12 with respect to seat 20, the user may select the weight from either a seated or a standing position. In either case, after the weight has been selected the user should be seated in seat 20 with the user's back preferably resting against support cushion 27. The direction the user is facing is considered the forward facing direction for purposes of this invention. After the user is properly seated, the user pushes on foot start 15, with his or her foot in order to move the four bar linkages and hence handles 16*a* and 16*b* toward the user so that the user can readily grasp either one, or both, handles 16*a* and 16*b*. Once the user has grasped the handles 16*a* and 16*b*, in either a horizontal or neutral grip, the user is ready to perform a chest press exercise. As stated above, when utilizing a neutral grip (FIG. 13 and 14) the four-bar linkage mechanisms enable the user to maintain the proper biomechanical alignment of the joints. If a horizontal grip (FIG. 9 and 10) is utilized then the tilted axes maintain the proper alignment of the wrists.

The user performs the chest press exercise by first pushing on handles 16*a* and 16*b* in an outward direction as indicated by arrow "X" (FIGS. 12). As the user begins pushing in the direction as indicated by arrow "X", the bottom end 41 of handle lever arm 40*a* begins to rotate slightly in the direction of arrow "Y" which results in a slight tilt of handles 16*a* and 16*b* through the range of motion of the exercise, but not as much tilt as the angular deflection of primary arms 36 and 36*b*. This, slight tilt is enabled by the four-bar linkage mechanisms 14*a* and 14*b* in order to maintain proper biomechanical alignment of the user's wrist and forearm during performance of the exercise.

As the user continues to move the handles 16*a* and 16*b* in the outward direction, because of the orientation of the primary axes 46*a* and 46*b* and the secondary axles 50*a* and 50*b*, the four-bar linkage mechanisms 14*a* and 14*b* travel in planes which are tilted relative to vertical and are, therefore, non-perpendicular with respect to the plane "A" underlying the machine 10, as described herein above. The tilted planes through which the four bar linkage mechanisms travel enable the handles 16*a* and 16*b* to travel in a slightly curvilinear upwardly converging and downwardly diverging path, which is illustrated as "C" in FIG. 11. Such a movement simulates as natural a human musculoskeletal outward pushing motion as possible while maintaining proper biomechanical alignment of the user's joints. As the user is pushing the handles 16*a* and 16*b* in the outward direction, cable 58 is placed in a state of tension and floating pulley 60 is moved into the active position, as described above. Activation of floating pulley 60 operates to move the selected weights vertically, in an upward direction within housing 22. Once the user has fully extended his or her arms as shown in FIG. 10, the user then allows handles 16*a* and 16*b* to return the handles to the starting position for the exercise.

The handles 16*a* and 16*b* move along the same path of travel, but in the downward direction, until the handles are returned to the starting position. As the user allows the handles to move toward the starting position, the four-bar linkages travel through the tilted planes once again, this time in the inward direction with respect to the user. While the user is allowing handles 16*a* and 16*b*, to return to the start position, the selected weights are moving in a vertical, downward direction, within housing 22. Once the user reaches the starting point of the exercise, one repetition has been completed through the range of motion of the user.

It will be understood that various modifications may be made to the embodiment disclosed herein. For example, all lengths and angles given are approximate and may be varied by one of skill in the art, the machine may be utilized with, or without a high-mass, short-travel weight stack, the machine may be utilized with or without a seat, the primary lever arms may be parallel without substantially effecting the biomechanical alignment of the user's joints. Therefore, the above description should not be construed as limiting, but merely as exemplifications of a preferred embodiment. Those skilled in the art will envision other modifications within the scope spirit of the invention.

What is claimed is:

1. A chest press exercise apparatus, comprising:

a base member for supporting the apparatus on a horizontal plane and defining a first vertical plane normal thereto and a second vertical plane orthogonal to the first;

a support member extending from the base member;

a pair of four-bar linkage mechanisms supported by the support member, the pair of four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis and a follower lever arm pivotable about a secondary axis, the primary axes being disposed at an angle with respect to each other and to the second vertical plane such that the lower end of the primary axes are tilted inwardly toward each other and the second vertical plane,

the primary and follower lever arms lying in a common plane tilted at an angle relative to the first vertical plane;

a handle operatively associated with each of the four-bar linkage mechanisms,

a weight mechanism operatively associated with the pair of four-bar linkage mechanisms for resisting movement of the four bar linkage mechanisms; and

wherein the primary and follower lever arms travel in the common plane as the pair of four-bar linkage mechanisms are displaced between a first position and a second position while maintaining a correct biomechanical positioning.

2. The chest press exercise apparatus of claim 1, further comprising:

a handle lever arm operatively associated with both of the primary and follower arms of each of the pair of four-bar linkage mechanisms,

wherein each handle extends outwardly and perpendicularly from one of the handle lever arms, and curves

outwardly and downwardly therefrom at a 90 degree angle, such that the handles travel in a slightly curvilinear upwardly converging and downwardly diverging path as the four-bar linkage mechanisms are displaced between a first position and a second position while maintaining a correct biomechanical positioning.

3. The chest press exercise apparatus of claim 1, wherein the support member further comprises an extension arm and a support arm connected to the extension arm, and the primary and secondary axes are aligned with the support arm such that the pair of four-bar linkage mechanisms are pivotally supported by the support member.

4. The chest press exercise apparatus of claim 3, wherein each four-bar linkage mechanism further comprises a handle lever arm pivotally connected to both the primary lever arm and the follower lever arm.

5. The chest press exercise apparatus of claim 4, wherein each handle extends from one of the handle lever arms and is adapted to be gripped by the hand of a user.

6. The chest press exercise apparatus of claim 5, wherein each handle lever arm is pivotally connected to the primary lever arm about a first pivot point and to the follower arm about a second pivot point.

7. The chest press exercise apparatus of claim 6, wherein the distance between the first pivot point and the second pivot point on each handle lever arm is about 4.5 inches.

8. The chest press exercise apparatus of claim 5, wherein each handle includes a first handle portion extending in a first perpendicular direction from the handle lever arm, and a second handle portion extending in a second direction from the first handle portion, such that the handles travel in a slightly curvilinear upwardly converging and downwardly diverging path as the four-bar linkage mechanisms are displaced between a first position and a second position while maintaining a correct biomechanical positioning.

9. The chest press exercise apparatus of claim 8, wherein the second handle portion extends outwardly and perpendicularly from the first handle portion.

10. The chest press exercise apparatus of claim 9, wherein the second handle portion curves outwardly and downwardly from the first handle portion.

11. The chest press exercise apparatus of claim 1, further comprising a cable portion operatively associated with the weight mechanism for pulling the weight mechanism, attached at an attachment point between the first pivot point and the second pivot point of each primary lever arm.

12. The chest press exercise apparatus of claim 4, wherein the attachment point is about 55% of the distance between the first pivot point and the second pivot point of the primary lever arms, as measured starting from the second pivot point.

13. The chest press exercise apparatus of claim 12, wherein the distance between the first pivot point and the second pivot point on each primary lever arm is between about 25 to about 35 inches.

14. The chest press exercise apparatus of claim 13, wherein the distance between the first pivot point and the second pivot point on each primary lever arms is about 30.5 inches.

15. The chest press exercise apparatus of claim 11, wherein the primary lever arms are spaced apart from the follower lever arms.

16. The chest press exercise apparatus of claim 1, wherein the primary axes are parallel to and spaced apart from the secondary axes.

17. The chest press exercise apparatus of claim 16, wherein the primary axes are parallel to the first vertical plane.

18. The chest press exercise apparatus of claim 17, wherein the primary axes are spaced apart from the secondary axes by a distance of about 3.75 inches.

19. The chest press exercise apparatus of claim 18, wherein the primary axes of each four-bar linkage are disposed at an angle of between about 135 to about 165 degrees with respect to each other.

20. The chest press exercise apparatus of claim 19, wherein the primary axes of each four-bar linkage are disposed at an angle of about 150 degrees with respect to each other.

21. The chest press exercise apparatus of claim 1, wherein the support member is disposed at an angle with respect to the first vertical plane.

22. The chest press exercise apparatus of claim 21, wherein the support member is disposed at an angle of about 30 degrees with respect to the first vertical plane.

23. A chest press exercise apparatus comprising:

a base member for supporting the apparatus on a horizontal plane and defining a first vertical plane normal thereto and a second vertical plane orthogonal to the first;

a support member extending from the base member;

a first and a second four-bar linkage mechanism, the first and second four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis and a follower lever arm pivotable about a second axis, the primary axes being disposed at an angle with respect to each other and to the second vertical plane, such that the lower end of the primary axes are tilted inwardly toward each other and the second vertical plane;

the primary and follower lever arms being pivotable in a common plane tilted at an angle relative to the second vertical plane;

a weight mechanism operatively associated with the pair of four-bar linkage mechanisms for resisting movement of the four-bar linkage mechanisms; and

the support member comprising at least one post member connected to the base member and extending upwardly behind a seat, the first and second four-bar linkage mechanisms being supported on the at least one post member above and behind the seat;

wherein the primary and follower lever arms travel in the common plane as the four-bar linkage mechanisms are displaced between a first position and a second position.

24. A chest press exercise apparatus comprising:

a base member for supporting the apparatus on a horizontal plane and defining a first vertical plane normal thereto and a second vertical plane orthogonal to the first;

a support member extending from the base member;

a first and a second four-bar linkage mechanism supported by the support member, the first and second four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis and a follower lever arm pivotable about a second axis, the primary axes being disposed at an angle with respect to each other and to the second vertical plane, such that the lower end of the primary axes are tilted inwardly toward each other and the second vertical plane;

the primary and follower lever arms being pivotable in a common plane tilted at an angle relative to the second vertical plane;

wherein the primary and follower lever arms travel in the common tilted plane as the four-bar linkage mechanism are displaced between a first position and a second position;

the first and second four-bar linkage mechanisms each having a length, and each being pivotally supported at a first selected position along the length and each having a handle connected to a second selected position along the length;

the apparatus including a seat which is adapted to position a user in a disposition relative to the handles such that the handles are manually engageable by the user for pressing the handles between the first position and the second position in a chest press motion.

25. A chest press exercise apparatus comprising:

a base member for supporting the apparatus on a horizontal plane and defining a first vertical plane normal thereto and a second vertical plane orthogonal to the first;

a support member extending from the base member;

a first and a second four-bar linkage mechanism supported by the support member, the first and second four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis and a follower lever arm pivotable about a second axis, the primary axes being disposed at an angle with respect to each other and to the second vertical plane, such that the lower end of the primary axes are tilted inwardly toward each other and the second vertical plane;

the primary and follower lever arms being pivotable in a common plane tilted at an angle relative to the second vertical plane;

a weight mechanism operatively associated with the pair of four-bar linkage mechanisms for resisting movement of the four-bar linkage mechanisms;

wherein the primary and follower lever arms travel in the common tilted plane as the four-bar linkage mechanisms are displaced between a first position and a second position;

a handle lever arm operatively associated with each of the primary and follower lever arms;

the handle lever arm having a manually engageable handle for moving the four-bar linkage mechanisms between the first and second positions, the handle being disposed in a predetermined gripping orientation in the first position, the operative association of the handle lever arm with the primary and follower arms maintaining the handle extension in the predetermined gripping orientation during displacement of the four-bar linkage arms between the first and second positions.

26. A chest press exercise machine comprising:

a base member for supporting the apparatus on a horizontal plane and defining a first vertical plane normal thereto and a second vertical plane orthogonal to the first;

a support member extending from the base member;

a first and a second four-bar linkage mechanism supported by the support member, the first and second four-bar linkage mechanisms each including a primary lever arm pivotable about a primary axis and a follower lever arm pivotable about a second axis, the primary axes being disposed at an angle with respect to each other and to the second vertical plane, such that the lower end of the primary axes are tilted inwardly toward each other and the second vertical plane;

the primary and follower lever arms being pivotable in a common plane tilted at an angle relative to a vertical plane;

a handle operatively associated with each of the primary and follower arms of each of the pair of four-bar linkage mechanisms;

wherein the primary and follower lever arms travel in the common tilted plane as the four-bar linkage mechanisms are displaced between a first position and a second position;

wherein at least one of the primary and follower lever arms of each of the four-bar linkage mechanisms is operatively associated with a cable and a selected portion of a selectable weight stack, the selected portion of the weight stack being displaced by a distance upon movement of each four-bar linkage mechanisms from a first position to a second position.

27. The apparatus of claim **26**, wherein the primary and follower lever arms each have a length, a handle being interconnected to a first position and the cable being interconnected to a second position along the length of at least one of the four-bar linkage mechanisms, the first and the second positions being selected such that the selected portion of the weight stack travels through a distance less than about 60% of the displacement distance of the handle upon displacement of the handle from a first position to a second position.

* * * * *

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United States Patent [19]

Jones

[11] Patent Number: 5,273,505

[45] Date of Patent: * Dec. 28, 1993

[54] **HIGH ROW EXERCISE MACHINE**

[75] Inventor: **Gary A. Jones**, Falmouth, Ky.

[73] Assignee: **Hammer Strength Corporation**, Cincinnati, Ohio

[*] Notice: The portion of the term of this patent subsequent to Sep. 24, 2008 has been disclaimed.

[21] Appl. No.: **779,947**

[22] Filed: **Oct. 21, 1991**

[51] **Int. Cl.**[5] **A63B 21/08**

[52] **U.S. Cl.** **482/97**; 482/133; 482/142

[58] **Field of Search** ..... 482/97, 134, 92, 93, 482/133, 139, 142; 128/25 R

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Primary Examiner—Richard J. Apley

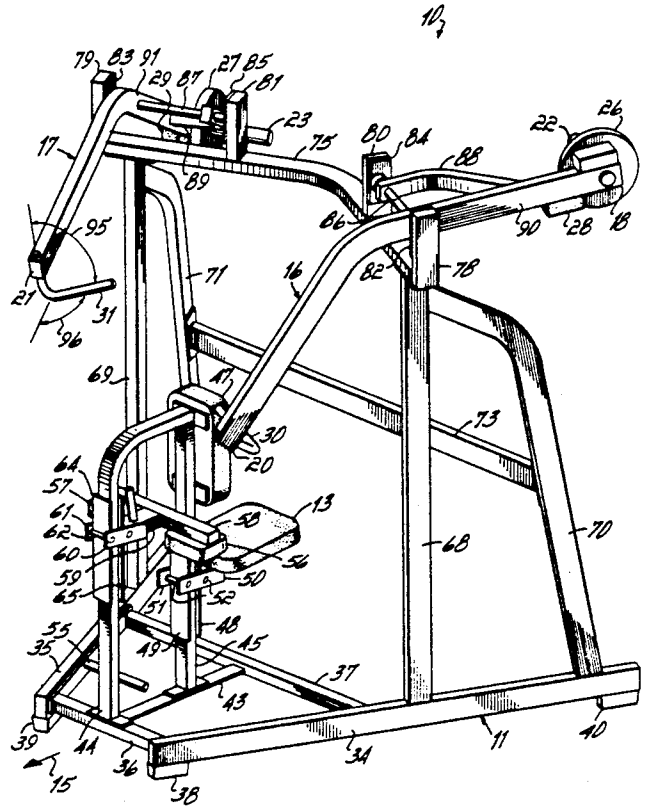
Assistant Examiner—Jerome Donnelly

Attorney, Agent, or Firm—Wood, Herron & Evans

[57] **ABSTRACT**

A high row exercise machine includes a frame symmetrical with respect to a vertical midplane, a seat connected to the frame adapted to support an exerciser along the midplane in a forward facing direction, and a pair of spaced levers pivotally connected to the frame above and behind the seat on opposite sides of the midplane. The levers pivot through vertical planes of motion which converge with respect to the forward facing direction of the seat. Each of the rearward ends of the levers is adapted to hold a selected weight resistance, and each of the forward ends of the levers includes an angled handle located in front of and above the exerciser supported on the seat. An exerciser supported on the seat reaches up and grasps the handles, with palms facing forward, and then pulls downwardly and slightly forwardly in a high row exercise motion to pivot the levers against the selected weight resistances held by the hubs.

20 Claims, 4 Drawing Sheets



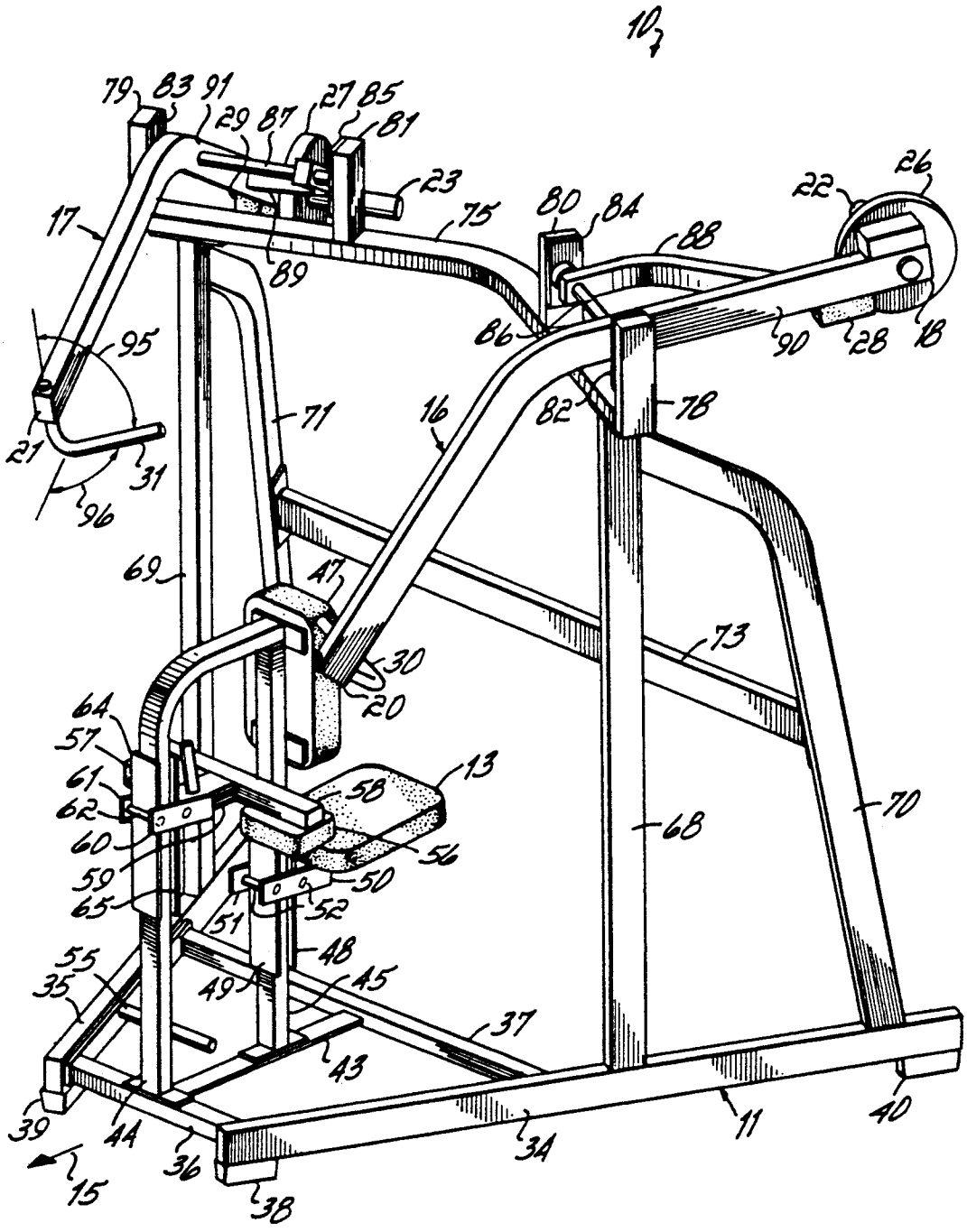

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FIG. 1

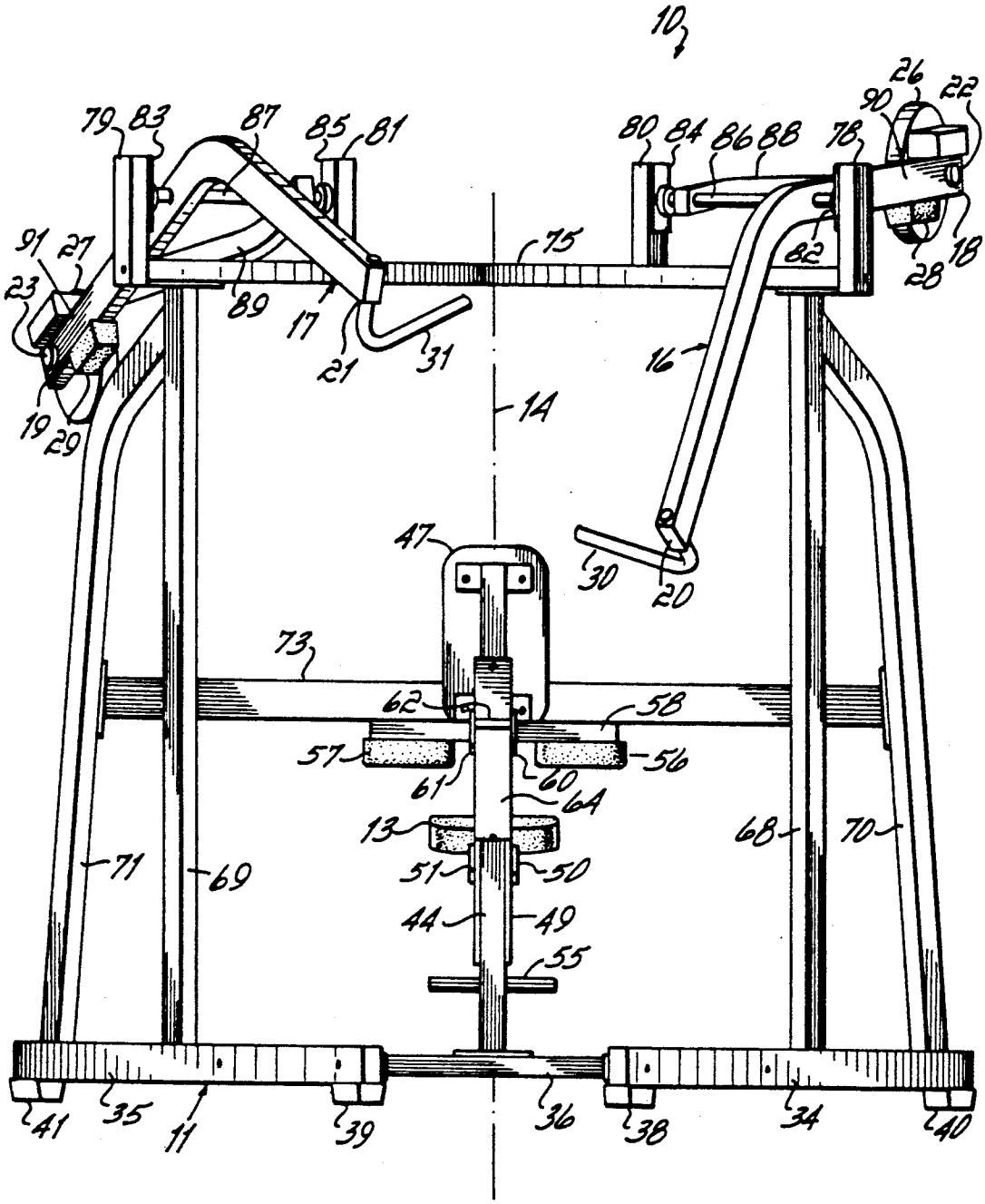
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FIG. 2

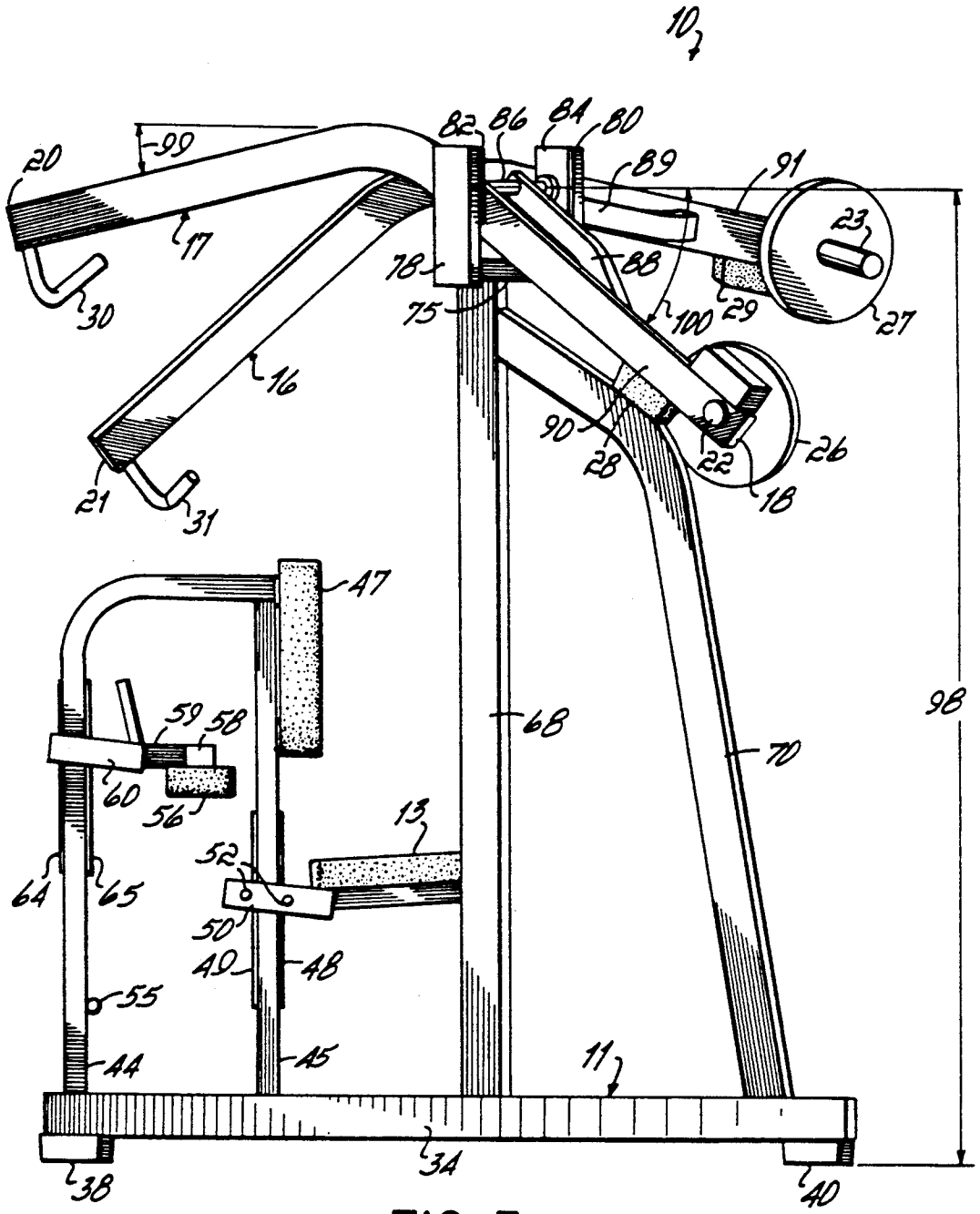
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FIG. 3

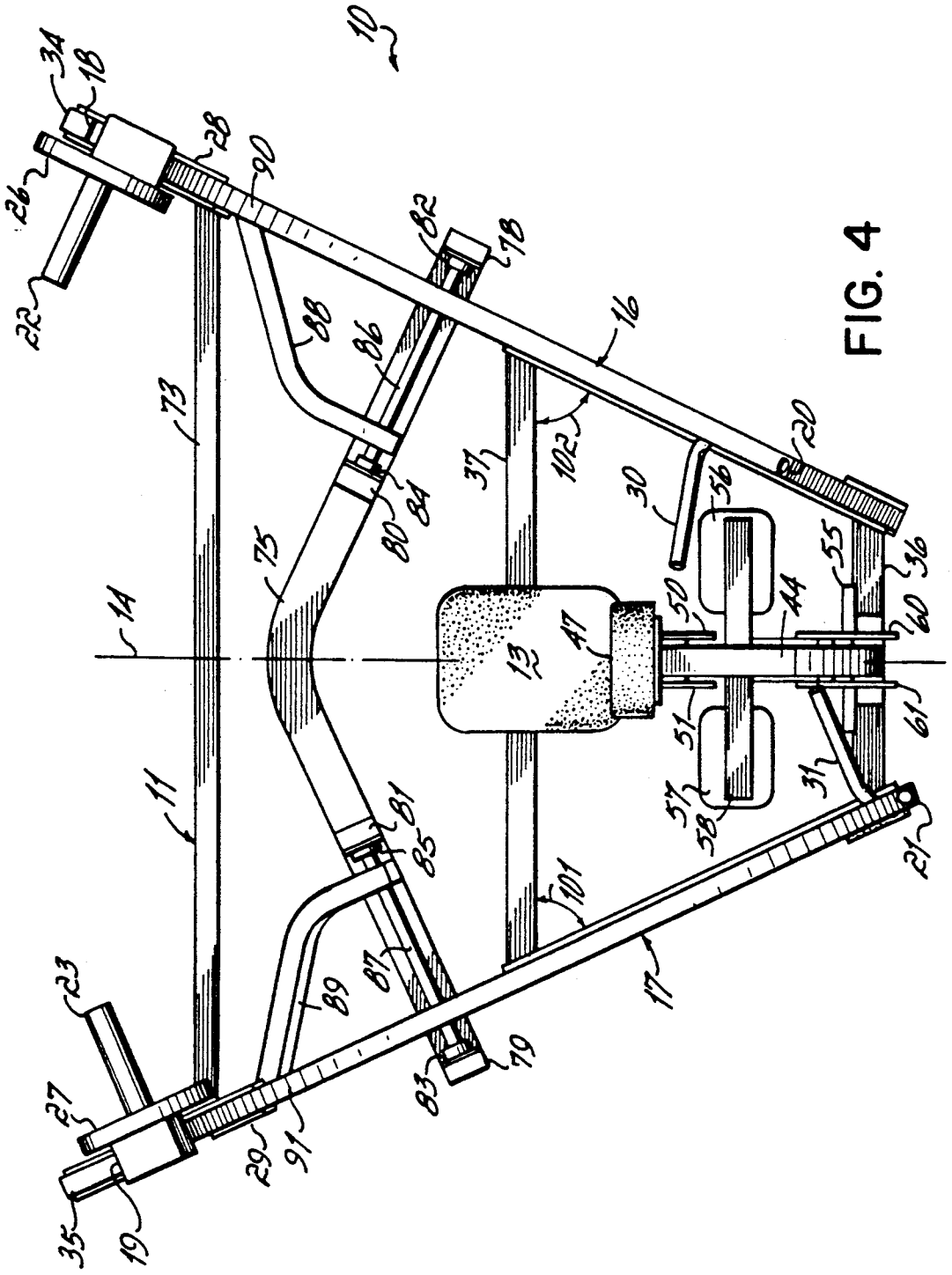
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FIG. 4

HIGH ROW EXERCISE MACHINE

FIELD OF THE INVENTION

This invention relates to weight training exercise equipment. More particularly, this invention relates to an exercise machine for exercising a muscle group which includes the latissimus dorsi, the rhomboids, the posterior deltoids and the biceps through a high row motion.

BACKGROUND OF THE INVENTION

Many athletes and non-athletes utilize weight lifting or weight training exercises to build strength and/or bulk, to prevent injury, or to improve overall condition and appearance. Typically, weight training exercises are performed with either exercise machines or free weights, i.e., barbells and weighted plates, dumbbells, etc. For various reasons, most exercise programs incorporate both machines and free weights in a variety of different exercise routines in order to maximize the effect of working out a desired number of muscle groups.

Free weights offer a number of advantages over exercise machines. For instance, they are relatively inexpensive in comparison to exercise machines. Free weights are also more versatile because a variety of exercises can be performed with one set of weights, whereas most exercise machines are designed for only one exercise. Even though some exercise machines accommodate more than one exercise, the cost of these machines usually increases proportionately with the number of exercises. Use of dumbbells also enables both arms to be exercised independently. Finally, free weights are popular among many weight lifters because the lifting movements are not restricted to prescribed planes of motion or prescribed angles.

Nevertheless, there are also a number of inherent disadvantages associated with free weights. One such disadvantage relates to safety. Although most weight room instructors strongly advise against an individual working out by himself or herself, this cautionary measure is particularly important when the lifting of free weights is involved. This is due to commonly recognized dangers such as the possibility of dropping a weight on a body part, or becoming trapped beneath a bar, which could easily occur in exercises such as bench press, incline press or squat. Additionally, through carelessness, loading and unloading of heavy weighted plates onto the ends of a bar sometimes results in an unbalanced bar that falls downward from its rack.

Another disadvantage associated with some free weight exercises relates to the body positioning required to perform a prescribed maneuver. The location of the weights with respect to the body may be awkward and/or dangerous. Finally, due to gravity, for some movements designed to exercise a muscle group in a particular way, a weight resistance simply cannot be applied against the muscular movement without a machine. Generally, any exercise which requires some downward pulling movement would come under this latter category. One particular pulling exercise movement is referred to as a high row. This movement exercises a muscle group which includes the latissimus dorsi, the rhomboids, the posterior deltoids and the biceps. Starting with arms extended above and in front of the head, with palms pronated, or facing outwardly, the exercise pulls downwardly and slightly forwardly to a position in front of the chest against a weight resistance applied throughout the motion. The motion is downward and slightly forward, while the applied resistance against this muscle group during the high row motion is directed upwardly and slightly rearwardly. The elbows move outwardly during the pulling motion.

One exercise maneuver which exercises this muscle group through this motion is a relatively close grip pull up performed with palms facing forward and, in an uppermost position, with the head of the exerciser pulled up and facing the bar. During this motion, the weight resistance of the body applies downward force, but there is also some rearward resistance felt by the exerciser, because the torso moves rearwardly as the body is pulled upwardly. With arms extended, the bar is directly above the head. When the body is pulled up, the bar is in front of the head. This movement also requires some outward movement of the elbows during pulling.

While a pull up performed this way may effectively exercise the above-described muscle group, it has a number of limitations. First, many people simply cannot lift their own weight, and this manner of pull up requires that the exerciser be able to lift at least his or her weight. Second, a pull up cannot be easily performed with one hand. One important aspect of weight training involves the isolation of muscle groups on both sides of an exerciser's body, so that the arms or the legs can be exercised independently, or simultaneously, depending on the circumstances. Particularly during rehabilitation, single limb exercise enables an exerciser to measure and compare the relative strength of an injured limb to the strength of the healthy limb, so that rehabilitation progress can be monitored.

Some exercise machines provide a pulley/cable exercise device which includes a pulley restricted bar held at opposite ends and pulled downwardly. This device is commonly referred to as a lat pulldown. A lat pulldown may be used to perform several different pulldown exercises, including a modified high row. This is done by connecting a narrow hand grip to the bar, grasping the grip with palms forward, leaning back and pulling downwardly from above the head to a position in front of the head, from either a seated or a kneeling position. Unfortunately, this manner of performing a high row exercise suffers from a number of deficiencies.

First, the resistance is directed upwardly, or vertical, with no transverse resistance felt by the exerciser. While an exerciser using this device may lean the torso rearward during the pulldown motion, this compound pulling/leaning movement does not apply any transverse resistance to the desired muscle group. In other words, this particular device does not track the natural position of the muscles through the high row motion previously described. Moreover, this machine can only be operated one arm at a time.

Perhaps due to costs, or due to a mistaken perception that the high row exercise motion is relatively unimportant, applicant is unaware of any exercise machine which exercises the high row muscle group in a sufficient manner.

It is an object of the invention to provide an exercise machine which maximizes the muscular benefit attainable during performance of a high row motion by applying resistance against the natural body motion throughout this movement.

It is another object of this invention to provide a high row exercise machine which is particularly suitable for exercising one arm at a time.

It is another object of the invention to provide a high row exercise machine which combines the advantageous features of both free weight exercise and exercise machines without incorporating the attendant disadvantages normally associated therewith.

SUMMARY OF THE INVENTION

This invention contemplates a high row exercise machine which includes a frame, a seat connected to the frame to support an exerciser facing a forward direction and a pair of spaced levers pivotally connected to opposite sides of the frame above and behind the seat. Rearward ends of the levers provide selectable weight resistances for exercising against. The forward ends of the levers include inwardly angled handles adapted to be grasped above the head of the seated exerciser, with the palms directed forwardly and the thumbs pointed inwardly. With the handles grasped, the levers may be pulled downwardly and slightly forwardly to a position in front of the chest in a high row motion, thereby to pivotally raise the respective weighted rearward ends and move the levers through vertical planes which converge with respect to the forward direction.

Because it has two independently pivotal levers, this high row exercise machine enables the performance of either simultaneous or alternate exercise of both arms. This feature is particularly advantageous in monitoring rehabilitation progress after an injury, where it is often necessary to compare the relative strengths of the arms.

In a related aspect of this feature, the levers are substantially balanced, with the weight of the rearward ends being only slightly greater than the forward ends. As a result, for each lever, the total moment about the pivot axis is very low, and the minimum weight that must be exercised against, i.e., with no weight plates supported, is very low. Therefore, and also because the pivotal lever has substantially no friction, the weights supported on the rearward ends of the levers closely approximate the actual weight resistance that is exercised against. This feature becomes important during the initial stages of rehabilitation, when it may be required to exercise against very low weight resistance and keep highly accurate records of actual weight lifted. In short, this machine facilitates the monitoring and measuring of rehabilitation progress through very low weight resistances.

In accordance with a preferred embodiment of the invention, a high row exercise machine includes a frame that is symmetric about a vertical midplane, a seat connected to the frame and adapted to support an exerciser facing a forward direction along the vertical midplane, and a pair of levers pivotally connected to the frame above and behind the seat. Forward ends of the levers extend in front of the seat and include angled handles which are adapted to be grasped and pulled downwardly and slightly forwardly to pivot the levers through planes of motion which converge forwardly toward the vertical midplane. When in an at rest position, the rearward ends of the levers rest against the frame, angled downwardly from horizontal. Each rearward end includes an inwardly directed hub adapted to hold at least one removable weight to enable an exerciser to provide a desired weight resistance for the levers. Each rearward end also includes a stop which rests against the frame when in an at rest position. The initial angle of the at rest position determines the magnitude of the applied resistance felt by the exerciser during initiation and throughout the exercise motion. The angled handles are located above and in front of the head of the exerciser when the levers are in the at rest position. A pair of pads located in front of the seat engages the upper thighs of an exerciser supported on the seat. The pads prevent upward movement of the exerciser during the pulldown motion. Like the seat, the pads are vertically adjustable with respect to the frame to accommodate exercisers of different size.

This high row exercise machine facilitates safe and efficient performance of a high row motion to exercise a muscle group which includes the latissimus dorsi, the rhomboids, the posterior deltoids and the biceps. More importantly, the structural orientation of the frame, including the converging vertical planes of motion through which the levers move, the locations of the pivot points with respect to the seat, the locations of the handles above and in front of the exerciser and the angles of the handles with respect to the exerciser's body all combine to accommodate the natural musculoskeletal make-up of the human body. Thus, this machine enables an exerciser to couple the exertable force against a selected weight resistance in a manner which, compared to a pull up or a modified pulldown exercise performed with a pulley/chain pull-down device, feels more compatible with the natural angles through which the body normally moves during a high row motion.

The use of levers provides a weight resistance which is directed upwardly and slightly rearwardly during the motion. The converging planes of the levers and the handle angles better accommodate the natural muscular position of an exerciser during this motion. As a result, maximum muscular benefits for this muscle group during this motion are achieved with this machine. At the same time, only a minimum amount of joint stress is felt by the joints associated with this muscle group.

The structural orientation of this high row exercise machine evolved from applicant's belief that most exercise machines oversimplify the musculoskeletal movements of the human body. While his accumulated years of observing and analyzing athletic movements of the body led him to conclude that most musculoskeletal movements are rather complex and involve multiple joints and multiple degrees of freedom, he also recognized that most exercise machines require bodily movement in directions or planes that are oriented simply at right angles or parallel to the torso of the body.

Based on these observations, and bolstered by his opinion that the ultimate objective of any exercise machine is to provide maximum muscular benefit with minimum joint stress, applicant perceived a need for improvement in the design of exercise machines and began working toward that goal. Feedback from athletes who have used this inventive high row exercise machine has confirmed that it constitutes a marked improvement over other methods for performing a high row exercise.

This high row exercise machine provides the benefits of both free weight exercise and exercise with weight machines, without incorporating the attendant disadvantages commonly associated with these methods of exercising.

These and other features of the invention will be more readily understood in view of the following detailed description and the drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a high row exercise machine in accordance with a preferred embodiment of the invention.

FIG. 2 is a front view, looking forward, of the high row exercise machine shown in FIG. 1.

FIG. 3 is a side view of the high row exercise machine shown in FIG. 1, depicting one of the lever arms in an at rest position.

FIG. 4 is a plan view of the high row exercise machine shown in FIG. 1.

DETAILED DESCRIPTION OF THE DRAWINGS

FIGS. 1–4 show a high row exercise machine 10 in accordance with a preferred embodiment of the invention. This machine 10 includes a frame 11 made of a number of straight and/or curved sections of heavy duty steel that are either welded or bolted together, or pivotally connected. A seat 13 is connected to the frame 11 along a vertical midplane 14 and adapted to support an exerciser in a forward facing direction indicated by directional arrow 15. Levers designated generally by numerals 16 and 17 ar pivotally connected to the frame 11 above and behind the seat 13. The frame 11 is symmetric with respect to the midplane 14, and the levers 16 and 17 are located on opposite sides of the midplane 14. In describing the details of the machine 10, with respect to forward direction 15, components which are symmetrical with respect to midplane 14 have been numbered so that the even numbered component resides to the left of the midplane 14 and the next higher odd number designates the corresponding symmetric component residing on the right side of the midplane 14.

Each lever has a rearward end and a forward end. Lever 16 includes rearward end 18 and forward end 20. Lever 17 includes rearward end 19 and forward end 21. Each rearward end is equipped with a hub adapted to hold at least one removable weight and a rubber stop adapted to coact with the frame 11 to limit downward pivotal movement of the lever with respect to the frame 11. As shown in FIG. 1, rearward end 18 of lever 16 includes hub 22 for supporting at least one removable weight 26 and stop 28 to coact with frame 11. Forward end 20 of lever 16 includes a handle 30 adapted to be grasped and pulled downwardly by an exerciser supported on the seat 13. Similarly, rearward end 19 of the lever 17 includes hub 23 for supporting at least one removable weight 27 thereon and stop 29. Forward end 21 of lever 17 includes handle 31.

The frame 11 is supported at the bottom by bottom supports 34 and 35 which ar interconnected by front brace 36 and intermediate brace 37. Preferably, front brace 36 and intermediate brace 37 are interconnected to bottom supports 34 and 35 by welded end plates with through holes formed therein for bolted securement to bottom support 34 and 35. Alternately, the end plates could be welded, or the braces could be welded directly to the supports. Bottom support 34 rests on base plates 38 and 40 on the left, and bottom support 35 rests on base plates 39 and 41 on the right. The base plates may be rubber or metal. If metal, the base plates may have holes formed therethrough for securement of the machine 10 to a portable base, or to facilitate safe transport of the machine 10.

A bottom connector 43 extends between front brace 36 and intermediate brace 37. First upright 44 and second upright 45 extend vertically upwardly from front brace 36 and bottom connector 43, respectively. The uprights are supported at their bottom ends by end-welded plates. Near the top, first upright 44 bends rearwardly to connect to the top of second upright 45. Second upright 45 has a chest support 47 mounted thereon for supporting the chest of an exerciser (not shown) during performance of a high row exercise. Two resilient planar pieces 48 and 49 are mounted to rearward and forward surfaces, respectively, of second upright 45. Spaced parallel supports 50 and 51 extend forwardly from under seat 13 and are interconnected by a pair of horizontal spaced rods 52 which fit snugly on opposite sides of the planar pieces 48 and 49.

To raise or lower the seat 13 with respect to upright 45, the forward end of the seat 13 is tilted upwardly with respect to upright 45 so that the spaced parallel bars move away from, or provide clearance from pieces 48 and 49. In this orientation, the seat 13 may be moved upwardly or downwardly along the planar pieces 48 and 49, in a direction parallel to second upright 45. When the forward end is subsequently tilted downwardly, the parallel bars 52 of the seat 13 will frictionally engage the planar pieces 48 and 49 to hold the seat 13 in place. Any number of other methods for providing vertical adjustability for the seat 13 would also be suitable. If desired, the seat 13 could be mounted separately on a post telescoped within a base, with a bolt and pin connection to provide vertical adjustability for the post.

Similarly, the structural components supported on first upright 44 and designated generally by numeral 55 prevent upward movement of an exerciser supported on the seat 13 during a high row exercise. More particularly, pads 56 and 57 are mounted to a cross bar 58 and located in a position in front of the seat 13 to engage the tops of the thighs of an exerciser supported on the seat 13. Cross bar 58 is welded to a middle brace 59 to which vertically oriented, parallel spaced plates 60 and 61 are connected. Horizontal, parallel rods 62 interconnect the forward ends of spaced plates 60 and 61 to engage the forwardly and rearwardly directed surfaces of resilient planar pieces 64 and 65, respectively, which are mounted to the forward and rearward surfaces of first upright 44, respectively. The vertical position of the pads 55 and 57 may be raised or lowered with respect to first upright 44 by manipulating the cross bar 58 and the parallel rods 62, similar to the manner described above for vertically adjusting seat 13 along second upright 45.

On the left side of the midplane 14, front leg 68 and rear leg 70 extend upwardly from bottom support 34. On the right side of the frame 11, front leg 69 and rear leg 71 extend upwardly from bottom support 35. Rear legs 70 and 71 include an intermediate bend adjacent the top ends thereof, prior to connection to rearwardly directed surfaces of front legs 68 and 69, respectively. Rear brace 73 interconnects the rear legs 70 and 71, and top brace 75 extends across the frame 11 between the tops of front legs 68 and 69. Top brace 75 extends slightly beyond each of the front legs 68 and 69. Top brace 75 also supports the work boxes, or the structural components which mount the levers 16 and 17. The top brace 75 includes a centrally located forward bend to accommodate the forward convergence of the sides of the frame 11 and the corresponding forward convergence of the vertical planes through which levers 16 and 17 move.

For each of the levers, the work box includes spaced uprights mounted to and extending upwardly from top

brace **75**. Uprights **78** and **80** are located on the left side of the midplane **14**, while uprights **79** and **81** are located on the right side of midplane **15**. Bearings **82** and **84** are mounted to the inward and outward directed surfaces of uprights **78** and **80**, respectively. Similarly, bearings **83** and **85** are mounted to the inwardly and outwardly directed surfaces of uprights **79** and **81**, respectively. Axle **86** is connected between bearings **82** and **84**, and axle **87** is connected between bearings **83** and **85**. The axles pivot within the bearings to provide pivotal motion for the levers **16**, **17**. While any one of a number of different bearings would work, applicant has found that a pillow block bearing sold by Browning, and identified as Part No. VF 2S 116, has proved suitable. These bearings require maintenance only once a year, maintenance which consists of one shot of lubricating oil. Lever **16** includes a reinforcing arm **88** rigidly connected between axle **86** and lever body **90**. Similarly, lever **17** includes a reinforcing arm **89** rigidly connected between axle **87** and lever body **91**.

FIGS. **1** and **2** show the orientation of the handles **30** and **31** with respect to the forward ends **20** and **21**, respectively. Each of the handles **30** and **31** is actually a bent metal rod which has been bent to form a first portion which is connected to the forward end of the respective lever body, and a second portion which is grasped by an exerciser supported on the seat **13**. The two portions of each handle are separated by an angle of about 112°, an angle designated by numeral **95** in FIGS. **1** and **2**. In another manner of reference, the handle portions are bent inwardly about 68° from a 180° straight line. Preferably, the first portions of the handles are received within holes machined in the forward ends of the levers and then welded in place therein. The second portions of the handles are oriented at angles rotated about 84° from the rearward direction of the respective lever body, an angle designated by numeral **96** in FIG. **4**.

As shown in FIG. **3**, numeral **98** designates the vertical distance from the floor to the axle **86**, and this distance is preferably about 70". Each lever body has a total length of about 60 ¾". The pivot point of each lever body is located about 27" in front of the rearward end thereof. The distance from the forward end to the center of the bend in the lever body is about 31 ⅝". Due to the weight of the reinforcing arm, the hub and the stops, the rearward end of each lever weighs slightly more than the forward end so that, when at rest, in an initial at rest position, a rearward section the lever body **90** is angled about 40.5° downwardly from horizontal (i.e., 49.5 up from vertical), an angle designated by numeral **100**. This locates the forward section of the respective lever body at an angle of about 9.5° downward from horizontal (i.e., 80.5 up from vertical), an angle designated by numeral **99**. Combined, in an at rest position, this provides a lever body bend angle between the forward and rearward sections of about 130° (i.e., 49.5°+80.5°).

In operation, an exerciser seated on seat **13**, facing direction **15** and with chest pressed against chest support **47**, reaches upwardly above the head to grasp handles **30** and **31** of levers **16** and **17**, respectively, with palms facing forward. The application of a downward and sightly forward pulling force pivots the levers **16** and **17** with respect to the frame **11** and against the weight resistances held by rearward ends **18** and **19**, respectively. Through this motion, the elbows move slightly outwardly. The location of the pivot point, the bend in the lever body and the respective lengths of the forward and rearward sections of the levers provide a pivotal lever which is, initially, relatively easy to pivot. Pivotal pulling increases in difficulty throughout the pulling motion.

As shown best in FIG. **4** with respect to forward direction **15**, the sides of the frame **11** converge toward vertical midplane **14**. This forward convergence is designated by numeral **101** on the left and by numeral **102** on the right, and this angle of forward convergence is preferably about 25°. These angles correspond to the forward convergence of the vertical planes through which the levers move.

As mentioned previously, frame **11** enables a person to perform a high row exercise, either simultaneously with both arms or independently, a feature which is particularly desirable for rehabilitation.

While a preferred embodiment of the invention has been described, it is to be understood that the invention is not limited thereby and that in light of the present disclosure various other alternative embodiments will be apparent to a person skilled in the art. For instance, the structural orientation of some parts or portions of the frame **11** is not critical, so long as the position of the lever pivot axes, the lever lengths, the handles, and the converging vertical planes through which the levers rotate are maintained. Additionally, while the particular angles of the sides of the frame **11** and the handle angles shown are considered to be optimum at the present time, based upon feedback from those involved in strength training, it is entirely possible that some further refinements may evolve. Accordingly, it is to be understood that some modification may be made without departing from the scope of the invention as particularly set forth and claimed.

In the claims:

1. A high row exercise machine comprising:

a frame;

a seat supported within the frame along a vertical midplane and adapted to support an exerciser in seated position facing a forward direction; and

a lever pivotally connected to the frame above and behind the seat, the lever having a rearward end adapted to hold a selectable weight resistance means and a forward end extending forwardly in front of the seat and adapted to be grasped and pulled downwardly against the force of a selected weight resistance means in a high row motion by an exerciser while supported on the seat, with the palm of the exerciser facing in the forward direction and the thumb directed toward the vertical midplane, thereby to pivotally move the lever along and through a vertical plane which converges with respect to the forward facing direction of the seat.

2. The high row exercise machine of claim **1** wherein the lever plane converges with respect to the forward facing direction of the seat at an angle of about 25°.

3. The high row exercise machine of claim **1** and further comprising:

a handle connected to the forward end of the lever, the handle extending inwardly from the forward end at an angle that is non-perpendicular with respect to the converging lever plane of motion.

4. The high row exercise machine of claim **3** wherein, in an at rest position, the handle extends inwardly and upwardly with respect to the forward end of the lever.

5. The high row exercise machine of claim 1 and further comprising:

a chest support for supporting the chest of an exerciser seated on the seat and facing the forward direction.

6. The high row exercise machine of claim 1 and further comprising:

means for adjusting the vertical position of the seat with respect to the frame.

7. The high row exercise machine of claim 1 and further comprising:

means for restricting upward movement of the seated exerciser during pivotal movement of the lever.

8. The high row exercise machine of claim 7 wherein said restricting means further comprises:

a pair of spaced, downwardly directed pads located on opposite sides of the vertical midplane, the pads adapted to engage against portions of the upper thighs of an exerciser supported on the seat and facing a forward direction.

9. The high row exercise machine of claim 8 and further comprising:

means for vertically adjusting the position of the spaced pads with respect to the frame.

10. The high row exercise machine of claim 1 and further comprising:

another lever pivotally connected to the frame on an opposite side of the vertical midplane, the levers being symmetrical to each other with respect to the vertical midplane, thereby to provide simultaneous exercise of both sides of an exerciser's body through a high row motion using both arms and alternate high row exercise using only one arm at a time.

11. A high row exercise machine comprising:

a frame symmetrical with respect to a vertical midplane;

a seat supported by the frame along the vertical midplane and adapted to support an exerciser in a forward facing direction; and

a pair of spaced levers pivotally connected to the frame on opposite sides of the vertical midplane above and behind the seat, each lever having a rearward end adapted to hold a selectable weight resistance and a forward end adapted to be grasped and pulled downwardly against a selected weight resistance through a high row motion by an exerciser while supported on the seat, with the palms of the exerciser facing in the forward direction and the thumbs directed toward the vertical midplane, the levers adapted to pivot through vertical planes of motion which converge with respect to the forward facing direction of the seat.

12. The high row exercise machine of claim 11 wherein each lever further comprises:

a hub located at a respective rearward end, the hub adapted to hold at least one removable weight.

13. The high row exercise machine of claim 11 and further comprising:

a pair of handles, each handle located at a forward end of a respective lever, each handle angled inwardly from the respective converging lever plane of motion and at an angle non-perpendicular thereto.

14. The high row exercise machine of claim 11 wherein each lever pivots through a vertical plane which converges forwardly at an angle of about 25 .

15. The high row exercise machine of claim 11 and further comprising:

a chest support mounted in vertical orientation in front of the seat; and

means for vertically adjusting the position of the seat with respect to the chest support.

16. The high row exercise machine of claim 11 further comprising:

means for restricting upward movement of an exerciser supported on the seat during high row pulldown of the levers.

17. The high row exercise machine of claim 16 and further comprising:

means for vertically adjusting the position of the restricting means with respect to the frame.

18. The high row exercise machine of claim 11 wherein each lever includes a forward and a rearward section and an intermediate bend located therebetween and forward of the respective pivot axis, whereby, in an initial at rest position, each rearward section is angled downwardly from horizontal at an angle of about 40.5° and each forward section is angled downwardly at an angle of about 9.5° from horizontal.

19. The high row exercise machine of claim 18 and further comprising:

a pair of stops, each of the stops mounted proximate the rearward end of a respective lever and adapted to coact with the frame to limit downward pivotal movement of the respective rearward end.

20. A high row exercise machine comprising:

a frame symmetrical about a vertical midplane;

exerciser support means positioned proximate a center of the frame to locate an exerciser along the midplane in a forward facing direction;

a pair of space high row exercise means located on opposite sides of the midplane, each high row exercise means including a forward end handle adapted to be grasped and pulled downwardly and slightly forwardly in a high row motion against a selected weight resistance by an exerciser while engaging the exercise support means, with the palms of the exerciser facing in the forward direction and the thumbs directed toward the vertical midplane, thereby to pivot each respective high row exercise means about a pivot axis located above and behind the seat, each high row exercise means adapted to be pivoted against the respective selected weight resistance through a vertical plane of motion which converges with respect to the forward facing direction.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,273,505
DATED : December 28, 1993
INVENTOR(S) : Gary A. Jones

It is certified that error appears in the above-indentified patent and that said Letters Patent is hereby corrected as shown below:

Column 5, Line 25, "ar" should read

--are--.

Column 5, Line 53, "ar" should read --are--.

Column 7, Line 54, "80.5" should read --80.5°--.

Column 10, Line 8, "25" should read --25°--.

Column 10, Line 43, "space" should read

--spaced--.

Signed and Sealed this

Thirty-first Day of October 1995

Attest:

Attesting Officer

BRUCE LEHMAN

Commissioner of Patents and Trademarks

US005135456A

United States Patent [19]

Jones

[11] Patent Number: 5,135,456

[45] Date of Patent: Aug. 4, 1992

[54] **LOW ROW EXERCISE MACHINE**

[75] Inventor: **Gary A. Jones**, Falmouth, Ky.

[73] Assignee: **Hammer Strength Corporaation**, Cincinnati, Ohio

[21] Appl. No.: **691,507**

[22] Filed: **Apr. 25, 1991**

[51] **Int. Cl.**[5] **A63B 21/00**

[52] **U.S. Cl.** **482/133**; 482/93; 482/72

[58] **Field of Search** 272/118, 130, 134, 136, 272/118, 117, 116, 141, 400; 482/73

[56] **References Cited**

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Primary Examiner—Richard J. Apley

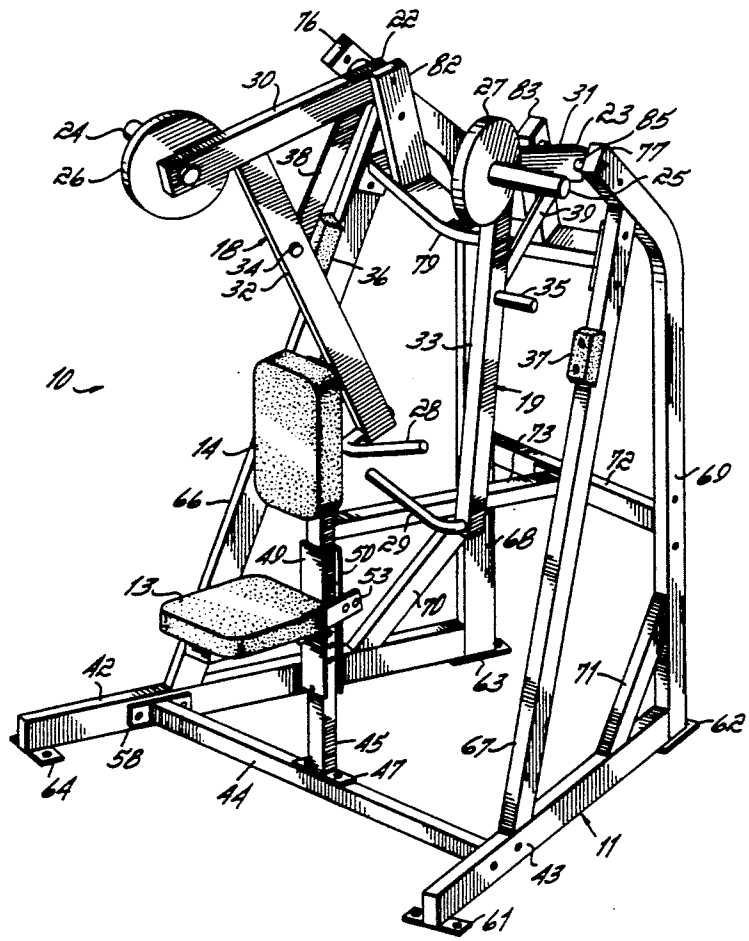
Assistant Examiner—J. Donnelly

Attorney, Agent, or Firm—Wood, Herron & Evans

[57] **ABSTRACT**

A low row exercise machine includes a frame, a seat and chest support connected to the frame along a vertical midplane, and a paiar of levers with first ends pivotally connected to the frame above and in front of an exerciser supported on the seat. Each lever includes an intermediately located hub for holding a selectable weight resitance and a handle located at a second, lower end thereof adapted to be grasped and pulled rearwardly through a low row exercise motion by an exerciser supported on the seat. The levers pivot through planes which converge with respect to the forward facing direction of the exerciser. The orientation of the frame, the seat and the levers, and particularly the convergence of the levers and the angles of connection of the handles with respect to the levers readily accommodate the natural musculoskeletal makeup of the human body during the performance of a low row exercise motion, thus maximizing the muscular benefit attainable through performance of this exercise motion.

20 Claims, 4 Drawing Sheets



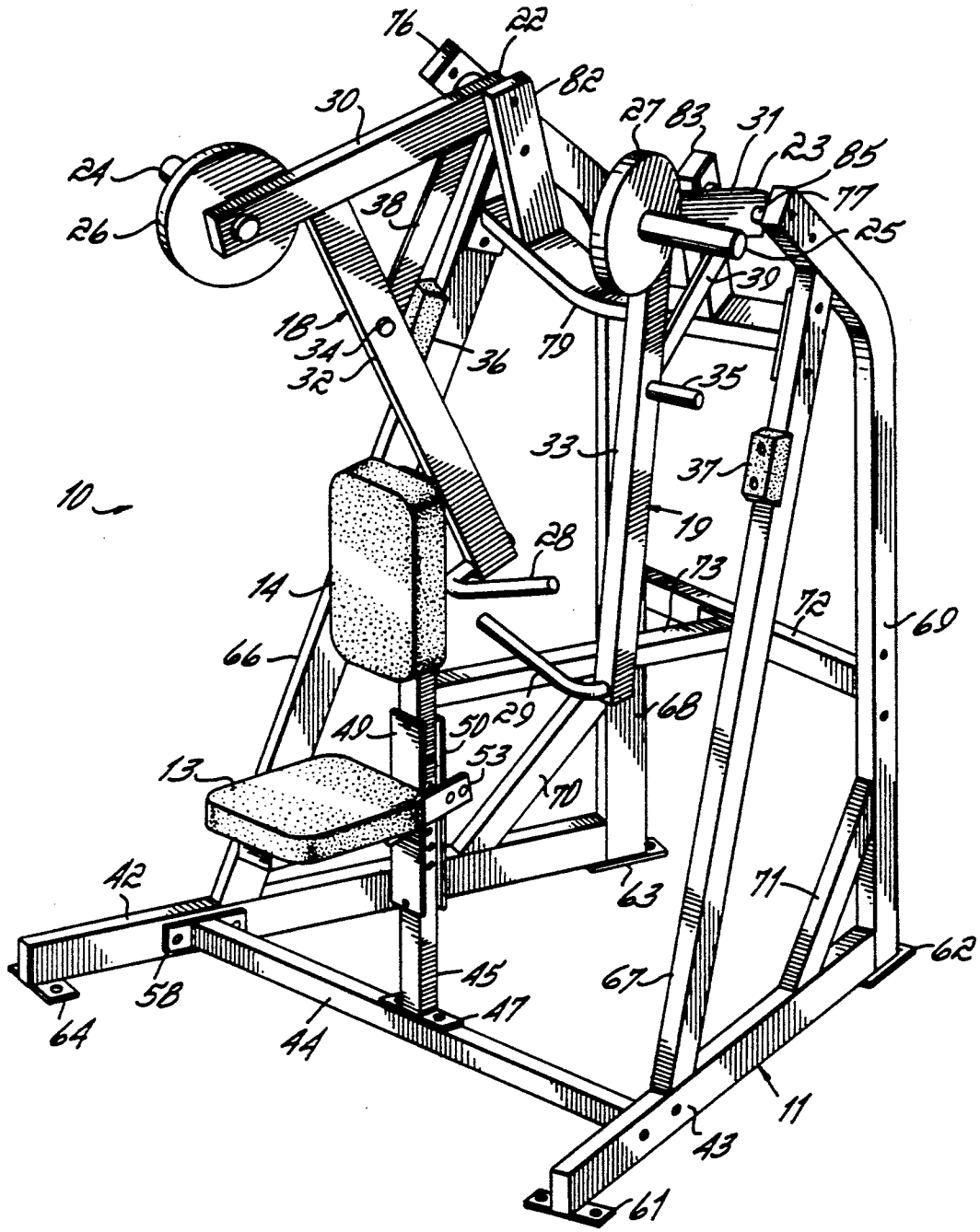

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FIG. 1

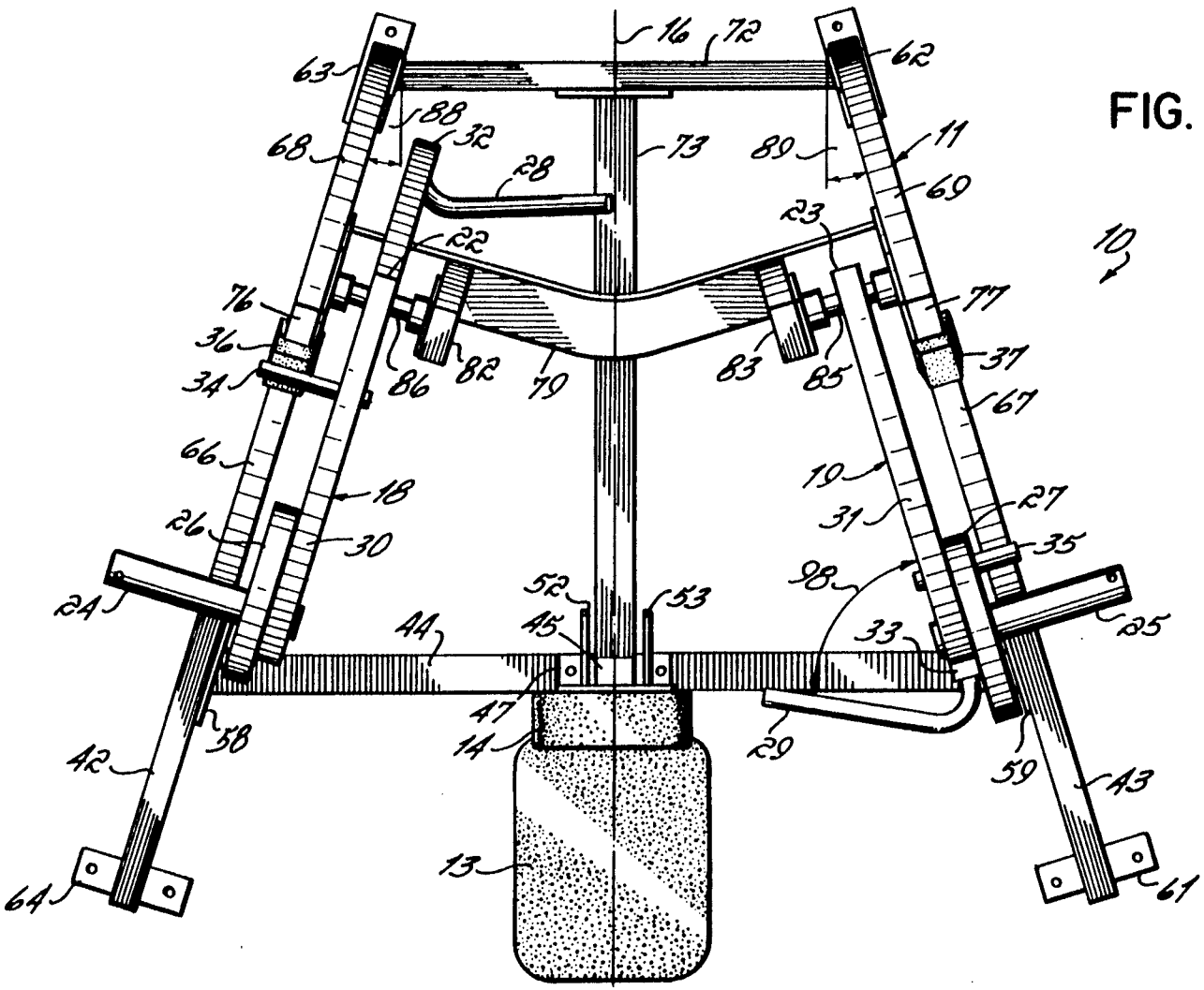
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FIG. 2

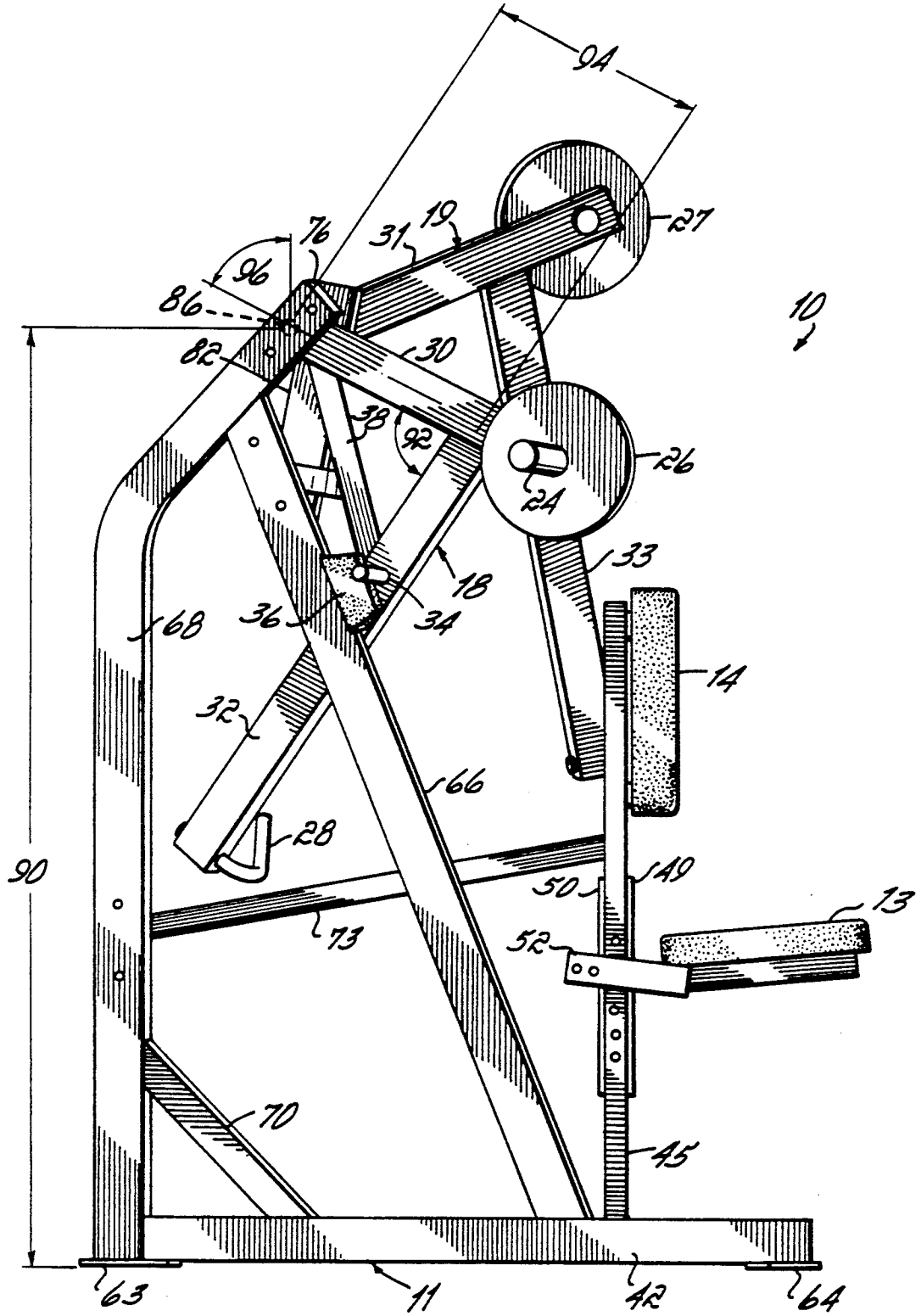
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FIG. 3

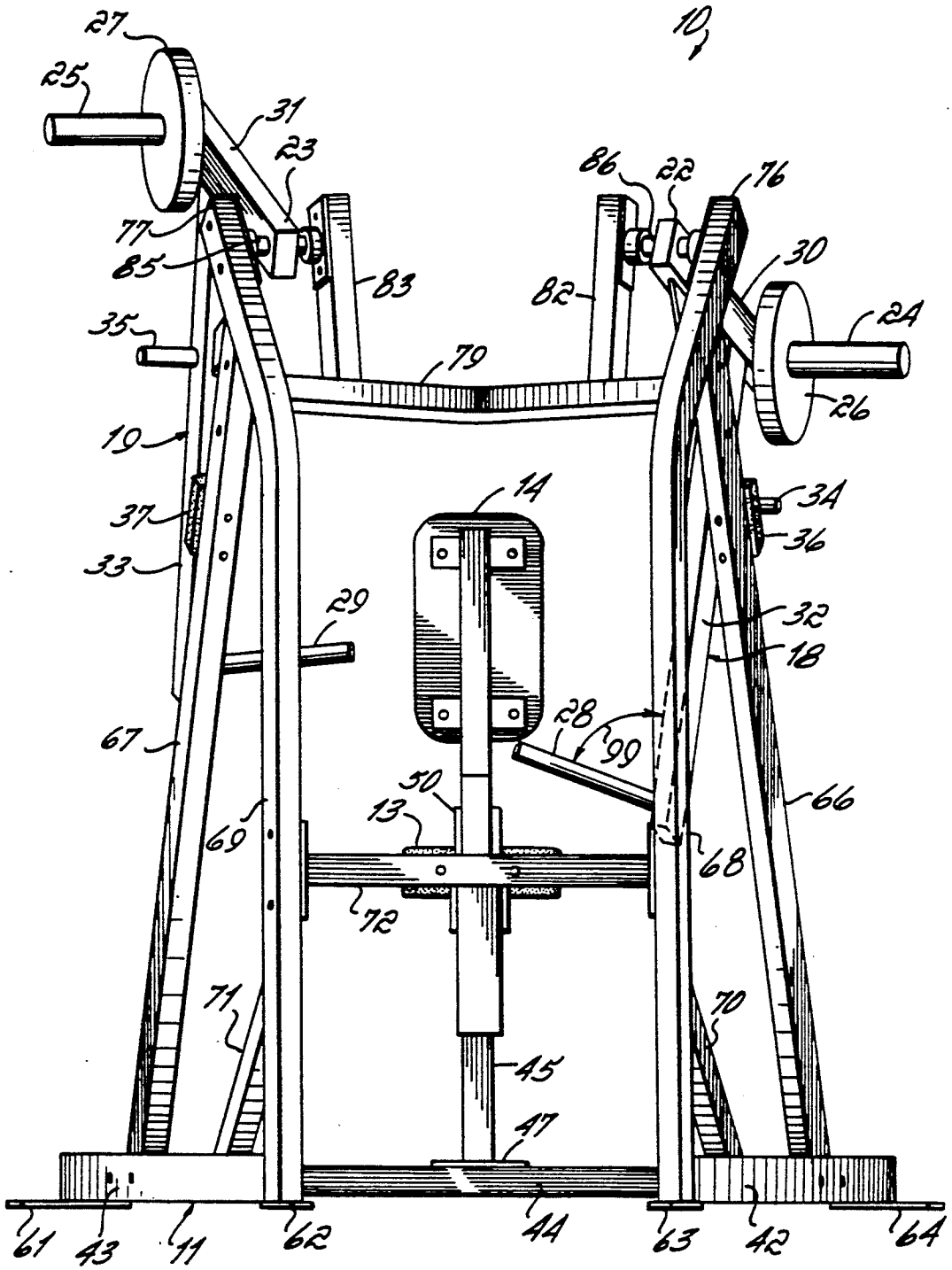
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FIG. 4

LOW ROW EXERCISE MACHINE

FIELD OF THE INVENTION

This invention relates to a low row exercise machine for exercising a muscle group that includes the latissimus dorsi, the rhomboids, the posterior deltoid, the trapezius and the biceps.

BACKGROUND OF THE INVENTION

Many athletes and non-athletes utilize weight lifting or weight training exercises to build strength and/or bulk, to prevent injury, or to improve overall condition and appearance. Typically, weight training exercises are performed with either exercise machines or free weights, i.e., barbells and weighted plates, dumbbells, etc. For various reasons, most exercise programs incorporate both machines and free weights in a variety of different exercise routines in order to maximize the effect of working out a desired number of muscle groups.

Free weights offer a number of advantages over exercise machines. For instance, they are relatively inexpensive in comparison to exercise machines. Free weights are also more versatile because a variety of exercises can be performed with one set of weights, whereas most exercise machines are designed for only one exercise. Even though some exercise machines accommodate more than one exercise, the cost of these machines usually increases proportionately with the number of exercises. Use of dumbbells also enables both arms to be exercised independently. Finally, free weights are popular among many weight lifters because the lifting movements are not restricted to prescribed planes of motion or prescribed angles.

Nevertheless, there are also a number of inherent disadvantages associated with free weights. One such disadvantage relates to safety. Although most weight room instructors strongly advise against an individual performing weight training exercises alone, this cautionary measure is particularly important when the lifting of free weights is involved. This is due to commonly recognized dangers such as the possibility of dropping a weight on a body part, or becoming trapped beneath a bar, which could easily occur in exercises such as bench press, incline press or squat. Additionally, through carelessness, loading and unloading of heavy weighted plates onto the ends of a bar sometimes results in an unbalanced bar that falls downward from a rack.

Another danger associated with some free weight exercises relates to the body positioning required to perform a prescribed maneuver. For instance, the most efficient way to perform an exercise referred to as a low row exercise is with a weighted barbell or dumbbells held in the hands, in front of the body, with the back bent and arms extended downwardly. The barbell is pulled upwardly toward the chest. This free weight, low row exercise is beneficial from a purely muscular viewpoint. However, it is also dangerous and/or awkward because of the position of the body with respect to the barbell during the exercise maneuver. The required bending of the back places the lower back muscles and the spine in a particularly vulnerable position during performance of this exercise in the described manner.

It might be said that the potential for injury from performing a low row exercise with free weights far outweighs the attainable muscular benefits. For this

reason, many individuals simply do not perform this exercise.

Another disadvantage associated with this exercise relates to the fact that the weight resistance, or opposing force that is exercised against, is always directed vertically downward by gravity. This limits the manner in which the weight resistance may be applied to the low row muscle group during the prescribed muscular movement. The resistance acted against throughout the motion does not correlate in any way to the strength curve for the low row muscle group.

While the benefit of performing a free weight low row exercise may be questionable, it also seems that the relatively high cost of exercise machines has effectively diminished the incentive to design and develop an exercise machine dedicated solely to exercising the low row muscle group in an effective, injury-free manner. As a result, although many exercise machines do provide some tangential muscular benefit for the low row muscle group, none are designed specifically for the purpose of optimally isolating the low row muscle group to maximize muscular benefit.

It is an object of this invention to provide a low row exercise machine which simulates exercise with free weights but without the disadvantages normally associated therewith.

It is another object of this invention to provide an exercise machine which optimally isolates the low row muscle group to maximize muscular benefit during performance of a low row movement.

SUMMARY OF THE INVENTION

This invention contemplates a low row exercise machine with a frame, a seat and chest support connected to the frame along a vertical midplane and a pair of levers pivotally connected to the frame in front of the seat. Each lever has an upper end pivotally connected to the frame above and in front of the seat, an intermediate hub for holding a preselected weight resistance and a handle at a lower end adapted to be grasped and pulled rearwardly in a low row exercise motion by an exerciser supported on the seat. The levers pivot through planes which converge with respect to the forward facing direction of the seat.

Movement of the levers through a low row, arcuate and upward exercise motion exercises a muscle group which includes the latissimus dorsi, the rhomboids, the posterior deltoid, the trapezius and the biceps. This low row exercise machine provides maximum muscular benefit for this muscle group in a manner which is safe and efficient. Moreover, this low row exercise machine simulates a free weight exercise because the levers move through forwardly converging planes which accommodate the natural musculoskeletal makeup of the human body.

More particularly, the natural musculoskeletal makeup of the body is accommodated by the structural orientation of the levers, the lever axes of pivotal movement and the handles connected to the levers. The particular combination of all of these structural aspects results in a machine which, based upon feedback from a number of individuals involved in the field of strength training, more naturally couples the muscular exertion of the low row exercise motion against a preselected weight resistance and in a direction of motion that is compatible with the musculoskeletal structural makeup of the body.

Because it has two independently pivotal levers, this low row exercise machine enables the performance of either simultaneous or alternate exercise of both arms. This feature is particularly advantageous in monitoring rehabilitation progress after an injury, where it is often necessary to compare the relative strengths of the arms.

In a related aspect of this feature, the angle of connection of the sections of the lever and the location of the weight supporting hub are substantially counterbalanced. As a result, for each lever, the total moment arm about the lever pivot axis is close to zero when no weights are on the hub. The minimum weight that must be exercised against, i.e., with no weight plates supported, is very low. Therefore, and also because the bearings that support the pivotal levers have substantially no friction, weights supported on the levers closely approximate the actual weight resistance that is exercised against, a feature that is not always true of many cam and chain or pulley exercise machines. This feature becomes important during the initial stages of rehabilitation, when it may be required to exercise against very low weight resistance and keep highly accurate records of actual weight lifted.

In accordance with a preferred embodiment of the invention, a low row exercise machine includes a frame, a seat and chest support connected to the frame along a vertical midplane and a pair of levers having upper ends pivotally connected to the frame on opposite sides of the midplane. Intermediate portions of the levers include hubs for holding weighted plates. Handles connected at angles to the lower ends of the levers provide natural grasping positions for coupling applied, low row pulling force along two planes of lever motion which converge with respect to the forward facing direction of the seat. Stops mounted on the levers coact with the frame to limit further downward pivotal movement of the levers.

The outer vertical planes of pivotal movement naturally accommodate the structure of the human body relative to the pulling motion utilized in a low row motion. As a result, a person supported on the seat is able to maximize the muscular benefits attainable by performing a low row exercise, while minimizing joint stress. Use of this invention provides exercise for the low row muscle group in a manner that does not stress joints or skeletal structure associated with this muscle group.

The structural orientation of this low row exercise machine evolved from applicant's belief that most exercise machines oversimplify the musculoskeletal movements of the human body. While his accumulated years of observing and analyzing athletic movements of the body led him to conclude that most musculoskeletal movements are rather complex and involve multiple joints and multiple degrees of freedom, he also recognized that most exercise machines require bodily movement in directions or planes that are oriented simply at right angles or parallel to the torso of the body. Based on these observations, and bolstered by his opinion that the ultimate objective of any exercise machine is to provide maximum muscular benefit with minimum joint stress, applicant perceived a need for improvement in the design of exercise machines and began working toward that goal. Feedback from athletes who have used this low row exercise machine has confirmed that it constitutes a marked improvement over pre-existing machines or free weight methods for performing a low row exercise.

This low row exercise machine provides the benefits of both free weight exercise and exercise with weight machines, while avoiding the attendant disadvantages commonly associated with these methods of exercising.

With this machine, the moment arm about the pivot point is lowest upon initiation of the pulling motion, then the moment arm increases to a maximum and then finally, the moment arm decreases somewhat. This "resistance curve" is produced by the initial starting angle of the weight supporting segment of the levers. It is believed that this resistance curve substantially matches the strength curve of the low row muscle group, and that this feature enables this low row exercise machine to maximize muscular benefit attainable during performance of a low row motion.

These and other features of the invention will be more readily understood in view of the following detailed description and the drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a low row exercise machine in accordance with a preferred embodiment of the invention.

FIG. **2** is a plan view of the low row exercise machine shown in FIG. **1**.

FIG. **3** is a side view of the low row exercise machine shown in FIG. **1**.

FIG. **4** is a front view of the low row exercise machine shown in FIG. **1**.

DETAILED DESCRIPTION OF THE DRAWINGS

FIGS. **1–4** show a low row exercise machine **10** in accordance with a preferred embodiment of the invention. This machine **10** includes a frame **11** made of a number of straight and/or curved sections of heavy duty steel that are either welded or bolted together, or pivotally connected. Overall, the front to back dimension of the machine **10** is about 52", the width is about 57", and the height is about 64". A seat **13** and a chest support **14** are connected to the frame **11** along a vertical midplane **16** (best shown in FIG. **2**) which bisects the machine **10**. The machine **10** is symmetric with respect to the vertical midplane **16**. Generally, in this description, even numbers are used to designate parts on the left side of the midplane **16**, and odd numbers are used to designate parts on the right side of the midplane, as viewed looking forwardly from seat **13** in FIG. **1**.

Levers **18** and **19** are connected to the frame **11** on opposite sides of the midplane **16**, and located in front of the seat **13** and chest support **14**. Levers **18** and **19** have first ends **22** and **23**, respectively, which are pivotally connected to the frame **11**. Each lever includes an intermediately located hub for supporting one or more weighted plates, and a handle connected at an angle to a lower end thereof. As shown in FIG. **1**, lever **18** includes hub **24** which supports weight **26**, and handle **28** is adapted to be grasped and pulled by an exerciser (not shown) supported on the seat **13** during a low row exercise motion. Lever **19** includes hub **25** which supports weight **27**, and handle **29**. More particularly, each lever is made up of upper and lower connected metal segments. Lever **18** includes upper segment **30** and lower segment **32**, while lever **19** includes upper segment **31** and lower segment **33**. The angle of connection between the upper and lower segments of levers **18** and **19** is preferably about 80°.

Levers 18 and 19 further include outwardly extending stops 34 and 35, respectively which coact with pads 36 and 37, respectively, mounted on the frame 11 to restrict further downward pivotal motion of the levers when in an at rest position. For additional structural support, each of the levers also includes a brace which spans diagonally between the first and second segments. Lever 18 includes brace 38, and lever 19 includes brace 39.

The frame 11 of the machine 10 further includes side bottom pieces 42 and 43 and center bottom piece 44. Upright 45 extends upwardly from center bottom piece 44. Upright 45 supports seat 13 and chest support 14. Preferably, connection between upright 45 and center bottom piece 44 is by bolting of a plate 47 welded to a bottom end of the upright 45. The seat 13 is vertically adjustable along upright 45. To provide adjustability, parallel surfaces 49 and 50 sandwich the front and back surfaces of upright 45, and these surfaces frictionally engage parallel, spaced bars connected transversely between forwardly extending connectors 52 and 53 (FIG. 2) which support the bottom of seat 13.

Center bottom piece 44 is preferably connected at its outermost end by bolts to bottom pieces 42 and 43 via plates 58 and 59 welded at forwardly converging angles. The four outermost corners of the frame 11 are also supported on similarly sized plates 61, 62, 63 and 64, which facilitate secured placement of the machine 10 in an exercise room, or during transportation.

Each side of the frame 11 includes a straight, rear leg rigidly connected at a forwardly extending angle and a front leg rigidly connected at a rearwardly extending angle. As shown in FIG. 1, rear leg 66 and front leg 68 are located on one side of the machine 10, and rear leg 67 and front leg 69 are located on an opposite side of the machine 10. Diagonal braces 70 and 71 extend between the respective bottom piece and front legs of the machine. An intermediate brace 72 extends horizontally between front legs 68 and 69 and a center support 73 extends between the intermediate brace 72 and upright 45.

Upper portions of front legs 68 and 69 bend rearwardly toward the respective rear legs 66 and 67. Upper ends of the rear legs are welded to the bottom surfaces of the rearward bent portions of the front legs. Uppermost portions 76 and 77 of front legs 68 and 69 extend beyond the tops of the welded rear legs 66 and 67, respectively. A forwardly and downwardly curved brace 79 extends between the tops of rear legs 66 and 67. Preferably the angle of bend of the curved brace 79 is about 145°, as shown best in FIG. 2. Rearwardly and upwardly extending members 82 and 83 are welded to the top surface of curved brace 79, and members 82 and 83 are located opposite from inwardly directed surfaces of uppermost portions 76 and 77, respectively. Axles 84 and 85 extend horizontally between uppermost portion 76 and member 82 and uppermost portion 77 and member 83, respectively, and the axles are connected thereto at their ends by bearings (not shown). Preferably, the bearings used are pillow block bearings sold by Browning, Part No. VF2S16. These bearings require maintenance only once a year, maintenance which consists of one shot of lubricating oil per year. Axles 84 and 85 are rigidly secured to upper segments 30 and 31, respectively, of levers 18 and 19.

Each of the axles is oriented perpendicular with an outer plane of vertical motion through which a respective lever moves when it is pulled by the exerciser. This is most clearly shown in FIG. 2. Angles 88 and 89 designate the angles of convergence of the sides of the frame 11 with respect to the forward facing direction of the seat 13 and chest support 14. This angle is preferably about 17°. As described previously, the convergence of the outer planes of lever movement more naturally accommodate the musculoskeletal makeup of the human body during performance of a low row exercise motion. FIG. 2 also shows the angle of connection of each of the handles 28 and 29 to its respective lever 18 or 19. Preferably, each handle is made of metal and curved at one end which is then welded within a recess at the lower end of a respective lever. Opposite ends of the handles angle upwardly and forwardly with respect to the frame so that the handles are not perpendicular to the bottoms of the levers. Each handle is bent at an angle of about 80°, an angle designated by numeral 98 and shown best in FIG. 2. The free end of each lever is displaced angularly downwardly from the respective lower segment at an angle of about 80°, an angle designated by numeral 99 and shown best in FIG. 4.

FIG. 3 shows a side view of the low row exercise machine 10 in accordance with a preferred embodiment of the invention. Numeral 90 designates the vertical distance between bottom piece 42 and axle 84, a distance which is preferably about 59½". FIG. 3 also shows the preferable angle of connection between upper segment 30 and lower segment 32 of lever 18. This angle is designated by numeral 92 and, as mentioned previously, is preferably about 80°. Upper segment 30 has a preferable length of about 23", and lower segment 32 has a preferable length of about 32½". The distance along upper segment 30 between axle 84 and the location of connection with lower segment 32 is designated by numeral 94, and is preferably about 16½". When in an at rest position, lever 18 is situated such that upper segment 30 resides at an angle of about 65° displaced from vertical, an angle designated by numeral 96.

The initial starting angle, the lengths of the upper and lower segments and the angle of connection therebetween combine to provide a lever 18 which feels unweighted when there are no plates on the hub. As a result, as explained earlier, this facilitates exercise of very low weights, and is particularly useful during rehabilitation of an injury. It also provides a lever 18 which has its minimum moment arm upon initiation of pulling during a low row exercise. The moment arm increases until segment 30 is horizontal, and then it decreases again. Lever 19 utilizes the same structural orientation as lever 18.

Because this machine 10 utilizes two independently pivotable levers 18 and 19, independent exercise of both arms through a low row exercise motion is possible. FIG. 4 shows a front view of the exercise machine 10 in accordance with a preferred embodiment of the invention.

While a preferred embodiment of the invention has been described, it is to be understood that the invention is not limited thereby and that in light of the present disclosure, various other alternative embodiments will be apparent to a person skilled in the art. For instance, the structural orientation of some parts or portions of the frame 11 is not critical, so long as the positioning of the lever pivot points, the lengths of the lever sections, handles, the seat and chest support and the vertical planes of motion are maintained. Additionally, while the particular angles shown in this application are considered to be optimum at this point in time, based upon

feedback from those involved in strength training, it is entirely possible that some further refinements may evolve. Accordingly, it is to be understood that changes may be made without departing from the scope of the invention as particularly set forth and claimed.

I claim:

1. A low row exercise machine comprising:
a frame;
a seat connected to the frame along a vertical midplane and adapted to support an exerciser in a forward facing direction; and
a lever having a first end pivotally connected to the frame in front of and above the seat, the lever also including weight supporting means adapted for holding a selectable weight resistance, the lever further having a second end adapted to be grasped by the hand of an exerciser supported on the seat and pulled toward the seat in a low row exercise motion, the second end adapted to be grasped so that the thumb of the hand is directly generally inwardly toward the midplane and the palm of the hand is directed generally downwardly, the lever being pivotal through a plane of motion which converges with respect to the forward facing direction of the seat so that the hand moves away from midplane when pulled toward the seat.

2. The low row exercise machine of claim 1 wherein said pivotal plane of motion converges at an angle of about 17°.

3. The low row exercise machine of claim 1 and further comprising:
a chest support connected to the frame in front of the seat to support the chest of the exerciser during performance of a low row exercise.

4. The low row exercise machine of claim 1 and further comprising:
a handle connected to the second end of the lever at an angle other than 90°.

5. The low row exercise machine of claim 4 wherein the lever further comprises:
a first segment having upper and lower ends, the upper end pivotally connected to the frame and weight supporting means located at the lower end; and
a second segment rigidly connected to the first segment between said upper and lower ends, and the handle connected to a bottom end of the second segment.

6. The low row exercise machine of claim 5 wherein said second segment further includes an outwardly extending stop adapted to coact with the frame to limit downward pivotal motion of the lever with respect to the frame.

7. The low row exercise machine of claim 1 wherein said weight support means comprises a hub rigidly connected to the lever.

8. The low row exercise machine of claim 1 wherein the seat is vertically adjustable with respect to the frame.

9. The low row exercise machine of claim 1 and further comprising:
a second lever pivotally connected to the frame and symmetric with the first lever with respect to the vertical midplane.

10. The low row exercise machine of claim 9 wherein both levers pivot through planes of motion which converge at angles of about 17° with respect to the forward facing direction of the seat.

11. A low row exercise machine comprising:
a frame;
a pad connected to the frame along a vertical midplane and adapted to support an exerciser in a forward facing direction;
a pair of levers located on opposite sides of the midplane, each lever including a first end pivotally connected to the frame above and in front of the pad, each lever further including an intermediately connected hub adapted to hold a selectable weight resistance and a handle at a second end thereof, below the pad, adapted to be grasped and pulled in a low row exercise motion by the hand of an exerciser supported by a rearwardly directed surface of the pad, each handle adapted to be grasped so that the thumb of the respective hand is directed generally inwardly toward the midplane and the palm of the hand is directed generally downwardly, the levers pivotal through outer planes of motion which converge toward the midplane with respect to the front of the pad so that the hands move away from the midplane when pulled toward the seat.

12. The low row exercise machine of claim 11 and further comprising:
a seat connected to the frame behind the pad for supporting the exerciser during performance of the low row exercise.

13. The low row exercise machine of claim 12 wherein the seat is vertically adjustable.

14. The low row exercise machine of claim 11 wherein the outer planes of pivotal motion converge at angles of about 17°.

15. The low row exercise machine of claim 11 wherein each of the lever handles is connected to a respective second end at an angle other than 90°.

16. The low row exercise machine of claim 11 wherein each lever further includes:
an upper segment pivotally connected to the frame and adapted to support a hub and a lower segment connected to the upper segment at an angle and adapted to support the respective handle; and
a brace segment connected between said first and second segments.

17. The low row exercise machine of claim 16 wherein each lever further includes an outwardly extending stop located on a lower segment thereof adapted to coact with the frame to limit downward pivotal movement of the respective lever with respect to the frame.

18. The low row exercise machine comprising:
a frame;
a seat and support connected to the frame along a vertical midplane; and
a pair of low row exercise means, each low row exercise means pivotally connected to the frame on opposite sides of the midplane above and in front of the seat and support, each pair of low row exercise means including a handle located below the support and adapted to be grasped and pulled rearwardly toward the support in a low row exercise motion by the hand of an exerciser seated on the seat and supported against the support, each handle adapted to be grasped so that the thumb of the respective hand is directed generally inwardly toward the midplane and the palm of the hand is directed generally downwardly, pivotal movement of each low row exercise means occurring in a plane which converges with respect to the forward

facing direction of the seat so that the hands move away from the midplane when pulled toward the seat.

19. The low row exercise machine of claim **18** wherein each low row exercise means further includes a handle connected to a lower end thereof at an angle other than 90° to accommodate natural musculoskeletal makeup of a person performing a low row exercise.

20. The low row exercise machine of claim **18** wherein the outer planes of pivotal movement converge with respect to the forward facing direction of the seat at angles of about 17°.

* * * * *

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United States Patent [19]

Jones

[11] Patent Number: 5,135,449

[45] Date of Patent: Aug. 4, 1992

[54] ROWING EXERCISE MACHINE

[75] Inventor: **Gary A. Jones**, Falmouth, Ky.

[73] Assignee: **Hammer Strength Corporation**, Cincinnati, Ohio

[21] Appl. No.: **586,426**

[22] Filed: **Sep. 21, 1990**

[51] **Int. Cl.**[5] **A63B 69/06**

[52] **U.S. Cl.** **482/72**; 482/97; 482/134; 482/136; 482/137

[58] **Field of Search** 272/72, 134, 118, 117; 272/118, 117

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Primary Examiner—Richard J. Apley

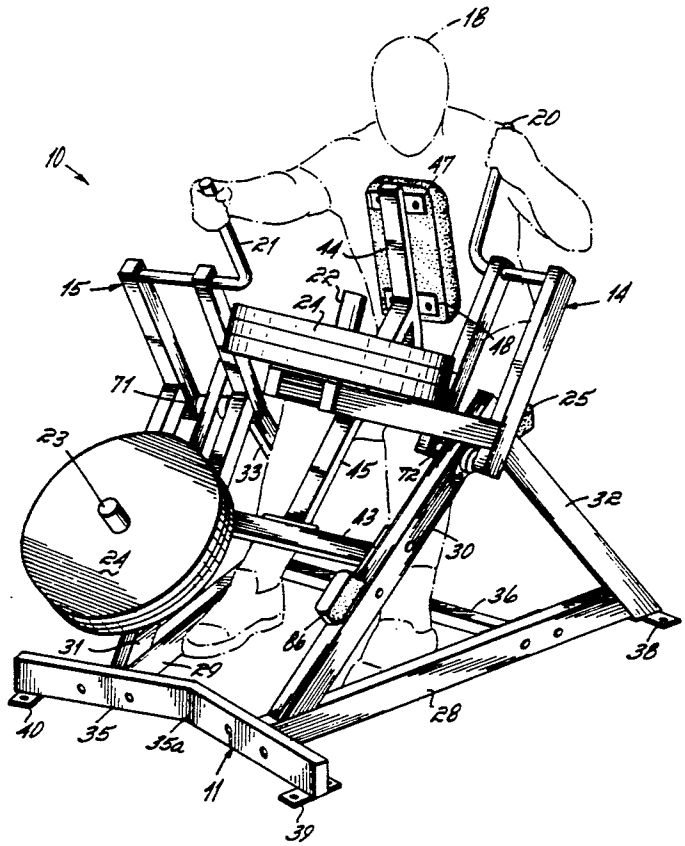
Assistant Examiner—D. F. Crosby

Attorney, Agent, or Firm—Wood, Herron & Evans

[57] **ABSTRACT**

A rowing exercise machine includes a frame, a seat and a chest brace supported by the frame, and a pair of levers pivotally connected to the frame in front of the brace and seat. Each of the levers has a lower end adapted to support at least one removable weight and a handle at an upper end adapted to be grasped by an exerciser supported on the seat. During the performance of a rowing exercise, the exerciser pulls the handles upwardly and rearwardly to pivot the levers against the weight resistances held by the lower ends. The levers move along two outer vertical planes that converge with respect to the forward direction of the seat, and each of the levers pivots independently with respect to the frame.

15 Claims, 5 Drawing Sheets



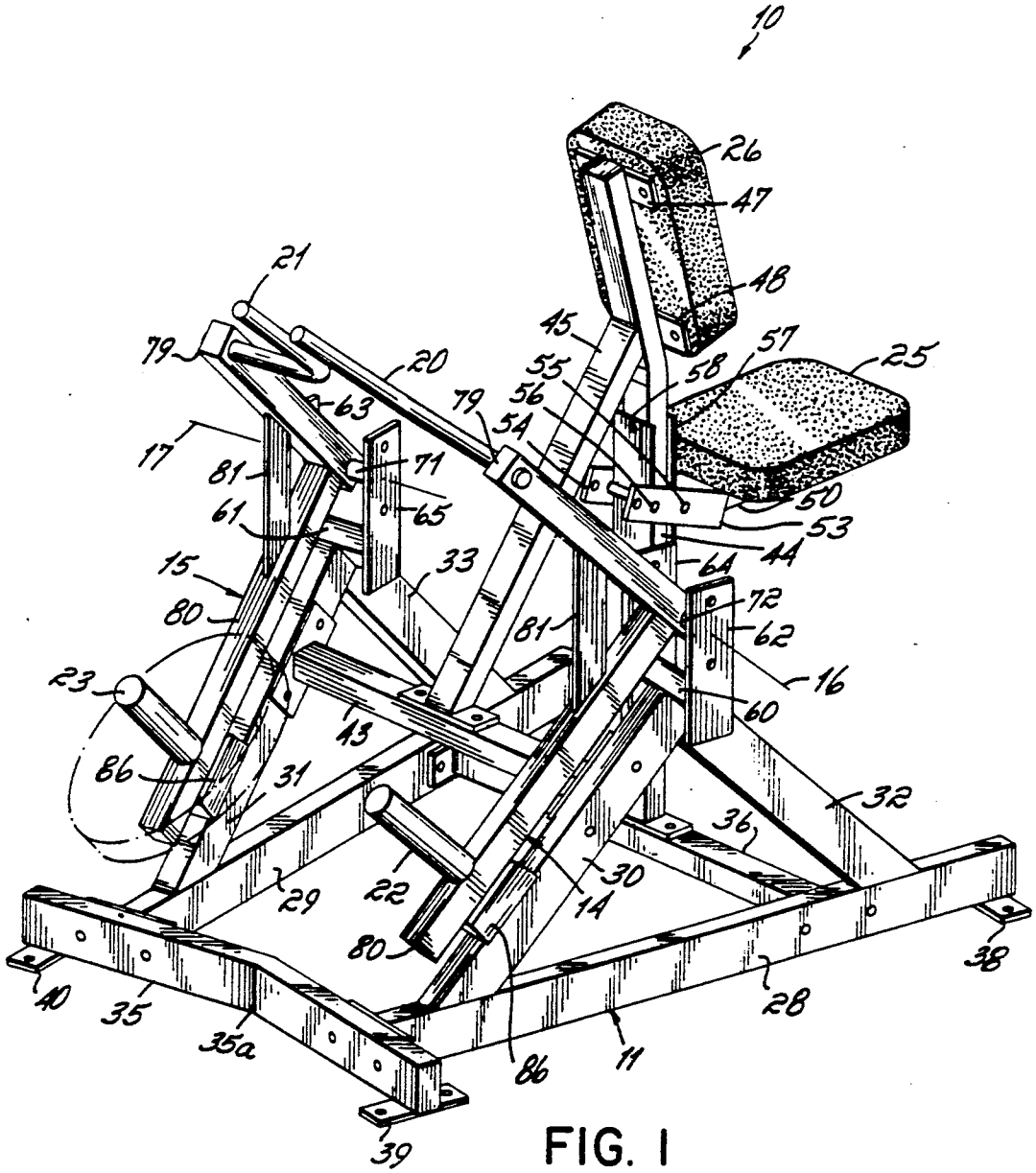

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FIG. 1

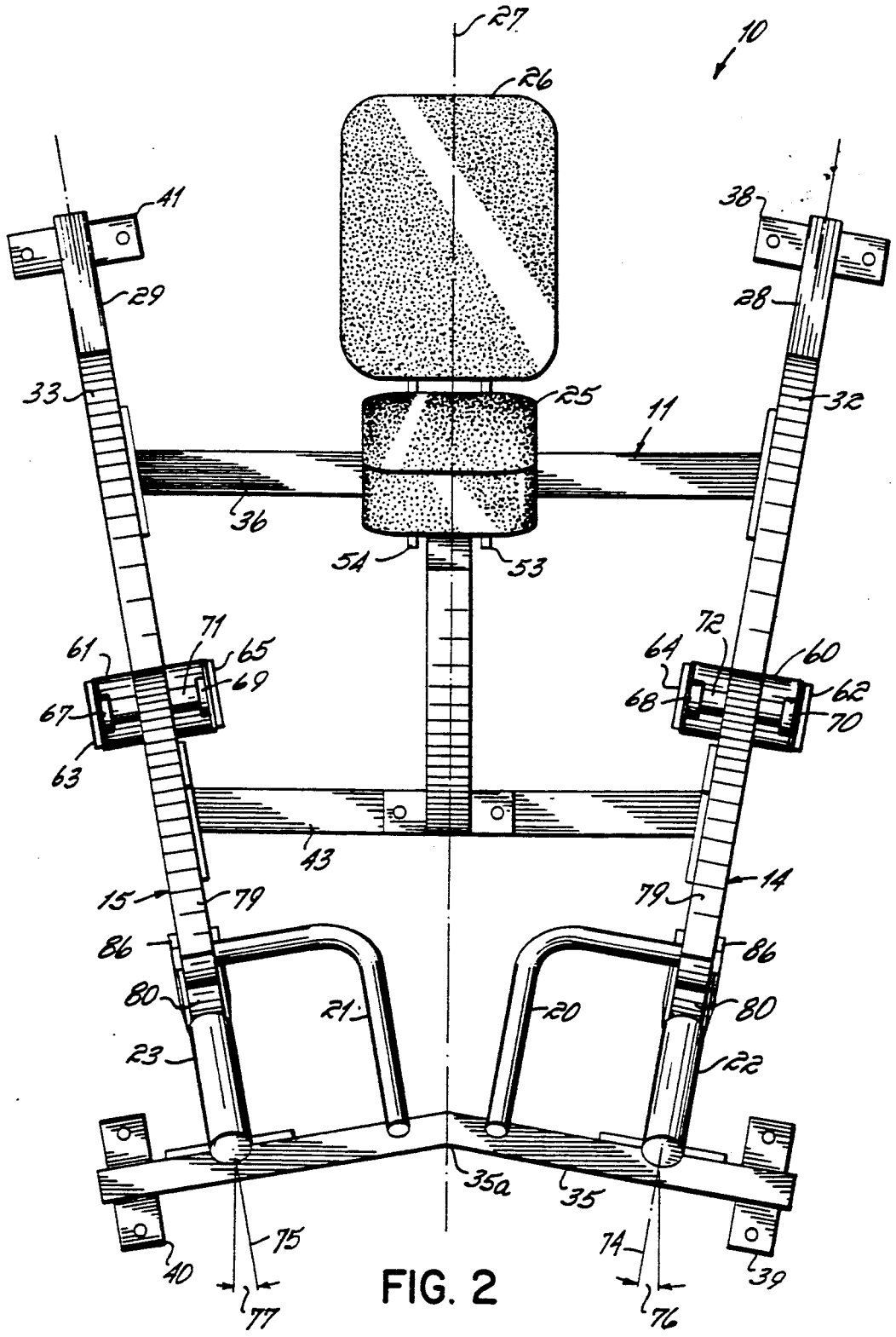
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FIG. 2

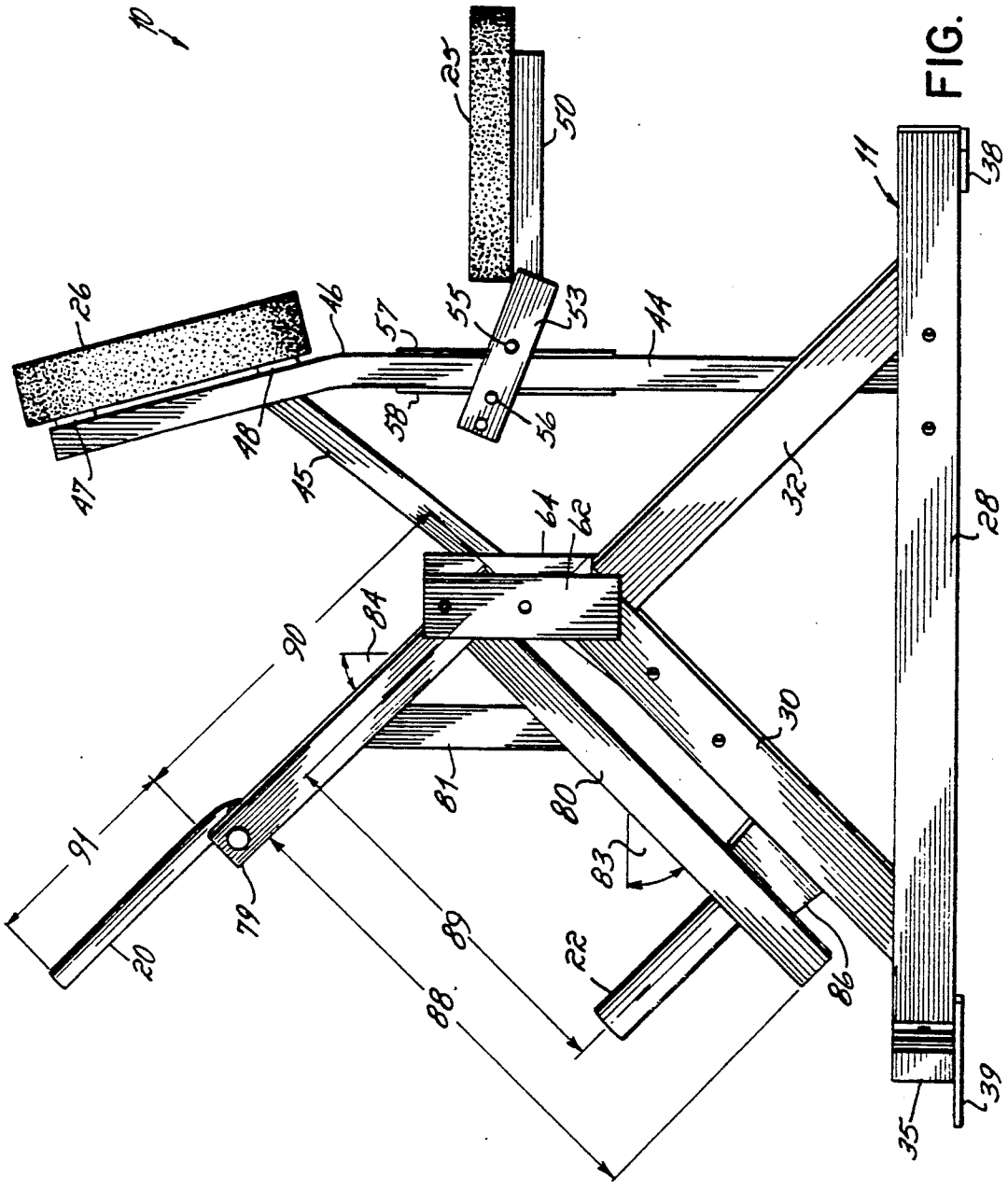
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FIG. 3

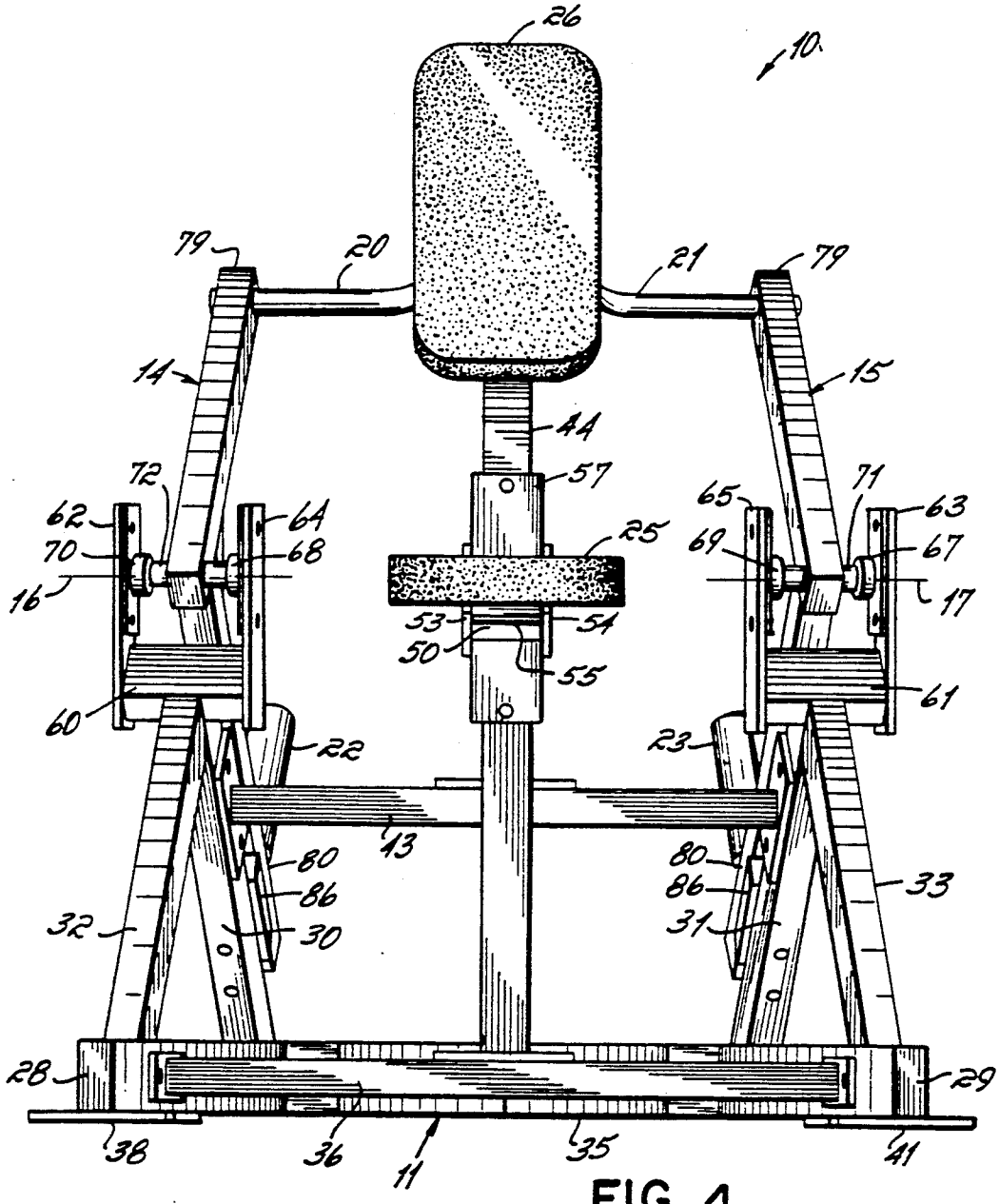
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FIG. 4

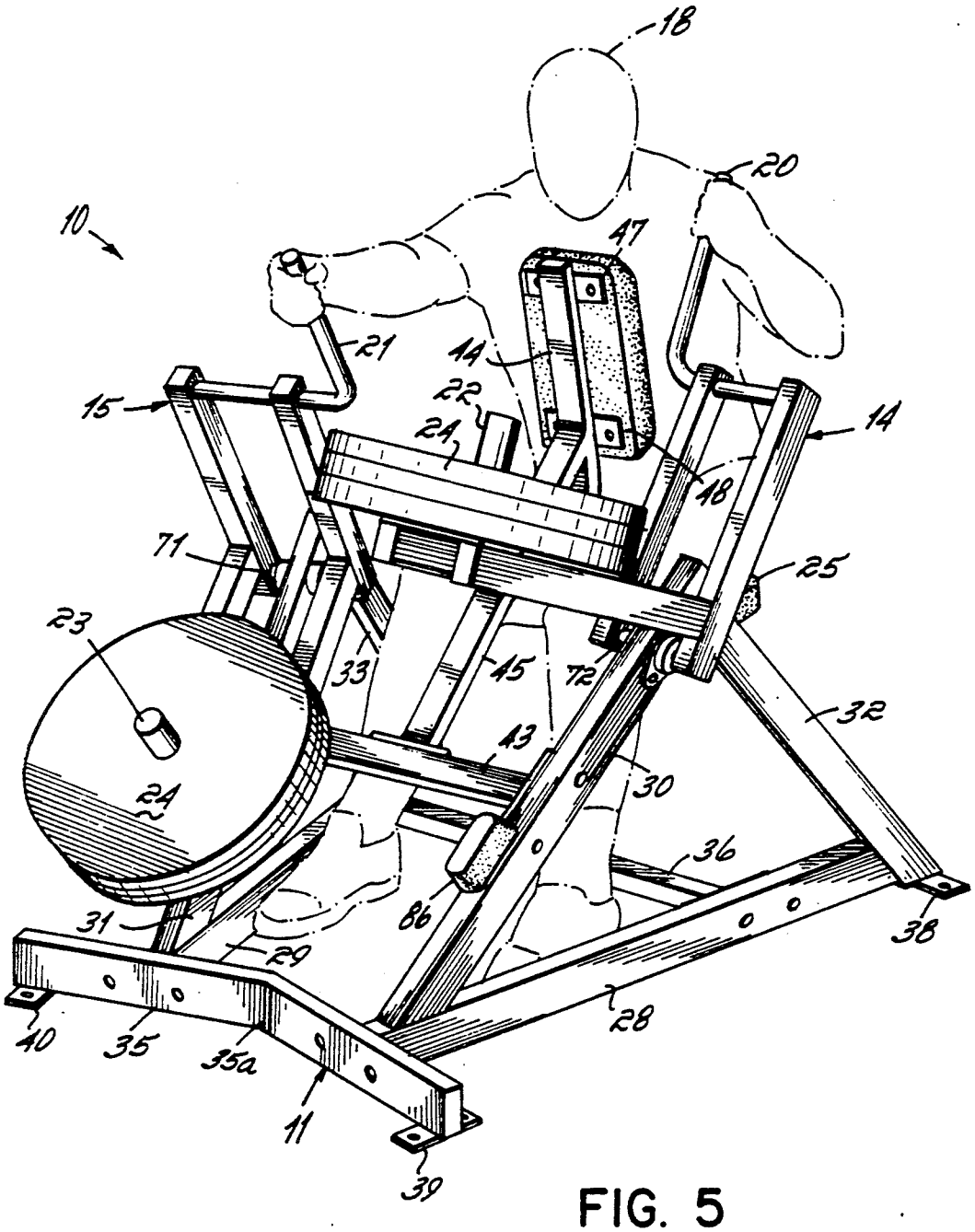
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FIG. 5

ROWING EXERCISE MACHINE

FIELD OF THE INVENTION

This invention relates to an improved rowing exercise machine that accommodates the musculoskeletal makeup of a person.

BACKGROUND OF THE INVENTION

Many athletes and non-athletes utilize weight lifting or weight training exercises to build strength and/or bulk, to prevent injury, or to improve overall condition and appearance. Typically, weight training exercises are performed with either exercise machines or free weights, i.e., barbells and weighted plates, dumbbells, etc. For various reasons, most exercise programs incorporate both machines and free weights in a variety of different exercise routines in order to maximize the effect of working out a desired number of muscle groups.

On one hand, free weights offer a number of advantages over exercise machines. For one, they are relatively inexpensive in comparison. Free weights are also more versatile because a variety of exercises can be performed with one set of weights, whereas most exercise machines are designed for only one exercise. For those exercise machines which do provide for more than one exercise, cost usually increases proportionately with the number of exercises. Another advantage may be more psychological than actual, but many "power" lifters simply prefer the lifting and moving of heavy weighted plates, or the "feel" of free weights. Finally, free weights are popular among many weight lifters because the lifting movements are not restricted to prescribed planes of motion and at prescribed angles determined by a machine.

However, there are a number of inherent disadvantages associated with free weights. One such disadvantage relates to safety. Although most weight room instructors strongly advise against an individual working out by himself or herself, this cautionary measure is particularly important when the lifting of free weights is involved. This is due to commonly recognized dangers such as the possibility of dropping a weight on a body part, or becoming trapped beneath a bar, which could easily occur in exercises such as bench press, incline press or squat. Additionally, through carelessness, loading and unloading of heavy weighted plates onto the ends of a bar sometimes results in an unbalanced bar that falls downward from its rack.

For this reason, a number of "leverage" machines have been developed over the past few years in an effort to combine the safety advantages of an exercise machine with the feel and psychological "lift" provided by free weights. One such machine is referred to as a rowing exercise machine. This enables an exerciser to perform an exercise commonly referred to as a "rowing exercise." While supported upon a seat connected to a frame, the exerciser leans forward and grasps the two handles of a lever which holds a barbell with weighted plates. By pulling the handles rearwardly, the weight is pivoted upwardly, toward the exerciser.

While this lever rowing exercise machine represents an advantage over the prior alternative, that of performing a rowing exercise without the benefit of a machine and at greater injury risk, even this lever rowing exercise machine suffers from a subtle disadvantage that most weight lifters apparently have assumed to be inherent with all exercise machines. That is, the planes and angles of prescribed movement do not seem quite right in relation to the musculoskeletal structure of a normal person. In short, this lever rowing exercise machine does not seem to "fit" the human body. As a result, some individuals experience excessive joint stress or compression from use of this machine, or machines of this type.

Moreover, although the prior lever rowing exercise machine could be used to exercise one arm at a time, it was not designed specifically for that purpose. As a result, performance of one-handed rowing exercise on this machine may even further accentuate the awkwardness that is felt by an exerciser. This is particularly disadvantageous during rehabilitation, when it is often desirable to monitor and compare the relative strength of a previously injured, recovering limb with a healthy limb.

It is therefore an object of the invention to provide an improved rowing exercise machine which, compared to prior machines, more naturally accommodates the musculoskeletal movements of a person's body.

It is another object of the invention to provide an improved rowing exercise machine that maximizes the exercise benefit attainable during a rowing motion while minimizing skeletal or joint stress.

It is still another object of the invention to provide an improved rowing exercise machine with increased versatility in exercising one arm at a time.

SUMMARY OF THE INVENTION

This invention contemplates a rowing exercise machine with a frame, a seat supported by the frame and two, independently movable levers that are pivotally connected to the frame in front of the seat. The ends of the levers have handles that are grasped and pulled rearwardly, either independently or simultaneously, to pivotally raise, with respect to the frame, weighted plates supported on hubs at the lower ends of the levers.

The frame has sides that converge toward the front of the machine and diverge in the rearward direction. The levers are mounted to the converging frame sides and move through corresponding, forward converging planes. When compared to prior rowing exercise machines, the outer planes of movement of this machine more naturally accommodate the musculoskeletal structure of the human body. Moreover, by providing two independently operable levers that are designed to match the natural movement of muscles of one side with respect to the entire body, this improved rowing exercise machine is particularly suitable for rehabilitation after an injury.

In accordance with the objects of this invention, a rowing exercise machine preferably includes a frame, a seat and a forwardly declined support brace connected to the frame and two levers, each lever pivotally connected to a forwardly converging side of the frame. Each lever has a handle located at its upper end and a weight supporting hub connected to a lower end. The lever pivot axes are located above and in front of the seat and are perpendicular to their respective sides of the frame. When the handles are grasped and pulled rearwardly and upwardly, the arcuate paths traversed by the handles and the levers lie along vertical planes that diverge rearwardly with respect to the seat.

Initially, when the levers are at rest, the handles are closest to one another, and they move farther apart as

the rowing motion progresses. The angled orientation of the levers and the handles with respect to the forward facing direction of the seat, along with the declined angle of the chest brace, places the exerciser in a natural position for coupling the applied pulling motion of the rowing exercise along two outer planes of motion that seem to more naturally accommodate the structure of the human body, relative to this maneuver. As a result, a person supported on the seat is able to maximize the muscular benefits during a rowing motion.

The evolution of this rowing exercise machine resulted from years of study, by the inventor, of athletic movements of the body relative to commonly performed weight training maneuvers. Based on his observations and experience in both fields, he concluded that most athletic movements involve compound motion of multiple joints, while exercise machines are designed for movements that are perpendicular or parallel to the torso. According to this view, most exercise machines oversimplify the body's movements, and there is a genuine need for improvement. Based upon feedback from athletes and other individuals involved in weight training, the rowing exercise machine of this invention constitutes a significant improvement over prior rowing machines.

This rowing exercise machine provides the benefits of both free weights and exercise machines without the attendant disadvantages commonly associated with either of these methods of exercising.

For this rowing exercise machine, the resistance variation through the course of the rowing movement is similar to the resistance variation provided by the prior lever type rowing machine. However, it is not identical. The angles and lengths of the forward ends of the levers and the locations of the pivot axes with respect to the seat and the chest brace have been structurally arranged to make it slightly easier to initiate the rearward rowing motion, and slightly more difficult to continue movement once the motion has been initiated, and then easier again at the end of the motion. This compensates for the initial acceleration that is required to commence the pulling force and the reduction in force caused by the momentum of a moving lever, and a terminal deceleration at the end of the movement. This differs from the one known prior lever rowing machine, which seems to become progressively more difficult through the rowing motion.

These and other features of the invention will be more readily understood in view of the following detailed description and the drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a rowing exercise machine in accordance with a preferred embodiment of the invention.

FIG. **2** is a top view of the exercise machine shown in FIG. **1**, with both exercise levers located in an at rest position.

FIG. **3** is a side view of the rowing exercise machine shown in FIG. **2**.

FIG. **4** is a rear view of the rowing exercise machine shown in FIG. **2**.

FIG. **5** is a perspective view of an alternative embodiment of the invention with an exerciser seated on the machine performing a rowing exercise.

DETAILED DESCRIPTION OF THE DRAWINGS

FIGS. **1–4** show a rowing exercise machine **10** in accordance with the preferred embodiment of the invention. Machine **10** includes a frame **11** made of a number of straight and/or curved sections of heavy duty steel that are either welded or bolted together, or pivotally connected. Exercise levers **14** and **15** are pivotally connected to the frame **11** and pivot about pivot axes **16** and **17**, respectively. An exerciser **18** (see FIG. **5**) grasps handles **20** and **21** to pivot levers **14** and **15** in an upward direction. When grasping, the palms of the exerciser **18** face inwardly, perpendicular to the forward facing direction of the exerciser **18**, and the thumbs point in an upward direction. The lower ends of the levers **14** and **15** include hubs **22** and **23**, respectively, which are adapted to hold one or more removable weights **24**.

During the performance of a rowing exercise on this machine **10**, the exerciser **18** is supported on a seat **25** that is connected to the frame **11**. While supported on the seat **25** in a direction facing the levers **14** and **15**, the exerciser **18** leans forwardly against the chest brace **26** and pulls the levers rearwardly against the weight supported upon the hubs **22** and **23**, respectively.

The frame **11** is longitudinally symmetric about a vertical midplane **27**, shown more clearly in FIG. **2**. Each side of the frame **11** includes bottom support that is connected to and supportive of front and rear legs. As shown in FIG. **1**, bottom leg **28** is connected to, and supports front leg **30** and rear leg **32** on the left side of the machine, as viewed by an exerciser **18** supported on seat **25**. Similarly, the right side of the machine includes bottom support **29** and front leg **31** and rear leg **33**.

A front brace **35** connects the forward ends of bottom supports **28** and **29**. The front brace **34** includes a centrally located bend **35***a* where it intersects vertical midplane **27**. A rear brace **36** also connects bottom supports **28** and **29**. As shown in FIG. **1**, the ends of rear brace **36**, and the forward ends of bottom supports **28** and **29** have plates welded thereon, with bolts (not shown) extending therethrough to provide connection. Preferably, the frame **11** is supported upon outer plates **38**, **39**, **40** and **41** (FIG. **2**) welded to the outermost corners of the machine. Bolt holes through these plates enable the machine **10** to be secured in place, or secured to a removable frame during transportation.

A lateral brace **43** extends through midplane **27** and is connected to inside surfaces of front legs **30** and **31**. An upright **44** extends upwardly from rear brace **36**. The upright **44** supports both the seat **25** and the brace **26**. For additional stability, a diagonal brace **45** extends between lateral brace **43** and upright **44**. As shown more clearly in FIG. **3**, upright **44** bends forwardly at point **46** between seat **25** and chest brace **26**. Chest brace **26** is connected to the upper end of upright **44** by welded plates **47** and **48**, preferably declining forwardly at an angle of about 15°. The seat **25** is supported upon arm **50** which is rigidly connected between plates **53** and **54**. Plates **53** and **54** are connected to each other by a pair of spaced rods **55** and **56** that frictionally engage a pair of spaced pads **57** and **58** mounted to upright **44**. This enables seat **2** to be vertically adjustable along upright **44** to accommodate different heights.

A connective structure for pivotally supporting the levers **14** and **15** are located, on each side of the frame, where the front and rear legs contact each other. As

best shown in FIG. 4, on the left side of the frame, a horizontally oriented support 60 connected between the upper ends of front leg 30 and rear leg 32. A pair of plates 62 and 64 are rigidly connected to the ends of the support 60. The plates 62 and 64 extend upwardly, and have bearings 68 and 70 connected to facing surfaces thereof along axis 16. An axle 72 rigidly connected to lever 14 seats within the bearings 68 and 70 to render the lever 14 pivotal about axis 16. Similarly, on the right side of the frame, horizontal support 61 is connected to front leg 31 and rear leg 33. Plates 63 and 65 are rigidly connected to the ends of support 61 and extend upwardly therefrom. Inwardly directed surfaces of plates 63 and 65 have bearings 67 and 69 connected thereto, along axis 17. An axle 71 rigidly connected to lever 15 is seated within the bearings to render lever 15 pivotal with respect to the frame.

As shown most clearly in FIG. 2, levers 14 and 15 pivot along outer planes 74 and 75, respectively, that converge with respect to the forward direction of the frame 11. Thus, for an exerciser 18 supported on the seat 25, levers 14 and 15 are pulled rearwardly and outwardly during performance of a rowing exercise. Numerals 76 and 77 designate the angles of convergence of planes 74 and 75 with respect to frame 11. Preferably, this angle is about 10°.

As shown in FIG. 3, lever 14 includes an upper member 79 rigidly connected to a lower member 80. A diagonally connected brace 81 provides additional stability between members 79 and 80. Preferably, the angle of connection between member 79 and member 80 is about 90°. In an initial at rest position, lower member 80 resides at an angle removed from horizontal of about 45°, designated by numeral 83. Thus, upper member 79 is displaced from vertical plane at an angle designated by numeral 84, which is also about 45°. To prevent metal-to-metal contact between lever 14 and the frame 11, a pad 86 is connected to front leg 30. Although not shown, lever 15 includes the same parts, with the same dimensions and the same angles of orientation. Lower member 80 preferably has a length 88 of about 23', and the distance 89 between the pivot axis 16 and hub 22 is about 19. The member 79 extends a length of about 19", designated by numeral 90, and handle 20 extends an additional length of about 10.5", designated by numeral 91.

As shown in FIG. 2, each handle comprises a bar welded to the upper member of the respective lever. The bar extends inwardly toward midplane 24 and then bends upwardly and forwardly at a right angle to a position that is parallel with respect to the upper member of the respective lever.

FIG. 5 shows an earlier embodiment of the invention. According to this embodiment, each lever included a pair of connected upper and lower members. It was originally thought that the frame 10 would need this additional structural stability to handle the amount of weight that is typically lifted by larger athletes. Compared to the preferred embodiment shown in FIGS. 1–4, the sides of the frame of the machine shown in FIG. 5 converge at sharper angles. Moreover, the declined angle of the chest brace is closer to vertical. Subsequent refinements of the machine to its present structural form, as shown in FIGS. 1-4, resulted from feedback from athletes who used the machine.

While I have described a preferred embodiment of this invention, it is to be understood that the invention is not limited thereby and that in light of the present disclosure of the invention, various other alternative embodiments will be apparent to a person skilled in the art. For instance, the structural orientation of some parts of the frame 11 is not critical, so long as the positioning of the seat 25 and brace 26 with respect to the locations of the pivot points and the lever lengths and angles is maintained. Additionally, while the particular angles shown are considered to be optimum at this point in time, based upon feedback from those involved in strength training, it is entirely possible that some further refinements may evolve. Accordingly, it is to be understood that changes may be made without departing from the scope of the invention as particularly set forth and claimed.

I claim:

1. A rowing exercise machine comprising:

a frame;

a chest brace supported by the frame and centered longitudinally on a vertical midplane, the frame being longitudinally symmetrical with respect to the vertical midplane, and the chest brace adapted to support an exerciser facing a forward direction along the vertical midplane; and

a pair of levers pivotally connected to the frame in front of the brace, each lever having a lower end adapted to support at least one removable weight and an upper end adapted to be grasped, with palms facing the midplane and thumbs pointed upwardly, and then pulled upwardly and rearwardly in a row motion along an outer vertical plane by an exerciser located on an opposite side of the brace, the levers being independently pivotal with respect to the frame and the outer vertical planes converging with respect to the forward facing direction.

2. The rowing exercise machine of claim 1 wherein each outer vertical plane converges at an angle of about 10° with respect to the forward facing direction.

3. The rowing exercise machine of claim 1 and further comprising:

a seat supported by the frame behind the chest brace.

4. The rowing exercise machine of claim 3 and further comprising:

means for selectively adjusting the vertical position of the seat.

5. The rowing exercise machine of claim 1 wherein the chest brace is inclined from the horizontal toward the front of the frame.

6. The rowing exercise machine of claim 1 wherein each lever further comprises:

an upper lever member pivotally connected to the frame at a pivot point located in front of the chest brace;

a lower lever member rigidly connected to the upper lever member adjacent the pivot point; and

a handle connected to a top end of the upper lever member, the handle having a first section extending inwardly toward the vertical midplane and a second section extending parallel with the respective outer plane.

7. The rowing exercise machine of claim 6 wherein the upper and lower members of each of said levers are connected at an angle of about 90°.

8. The rowing exercise machine of claim 7 wherein the initial at rest position of the upper member is about 45° from vertical.

9. The rowing exercise machine of claim 6 wherein the initial at rest position of the lower member is about 45° from horizontal.

10. A rowing exercise machine comprising:

a frame;

a chest brace supported by the frame and centered on a longitudinal vertical midplane through the frame, the frame being longitudinally symmetrical with respect to the vertical midplane and the chest brace adapted to support an exerciser facing a forward direction along the vertical midplane; and

a pair of levers pivotally connected to the frame in front of the brace, each lever having a lower end adapted to support at least one removable weight and an upper end adapted to be grasped, with palms facing the midplane and thumbs pointed upwardly, and then pulled upwardly and rearwardly in a row motion along an outer vertical plane by an exerciser located behind the brace, wherein the handles are a predetermined distance apart when the levers are in an initial, at rest position, and the outer vertical planes converge with respect to the forward facing direction so that the distance between the handles increases as the levers are pulled rearwardly.

11. A rowing exercise machine comprising:

a frame;

a seat supported by the frame and centered on a vertical midplane through the frame, the frame being longitudinally symmetrical with respect to the vertical midplane and the seat brace adapted to support an exerciser facing a forward direction along the midplane;

a chest brace connected to the frame in front of the seat; and

a pair of levers pivotally connected to the frame in front of the seat, each lever having a lower end adapted to support at least one removable weight and an upper end adapted to be grasped, with palms facing the midplane and thumbs pointed upwardly, and then pulled upwardly and rearwardly in a row motion along an outer vertical plane by an exerciser supported on the seat behind the brace, each of the outer planes converging forwardly toward the vertical midplane.

12. The rowing exercise machine of claim 11 wherein each of the outer planes converges forwardly at an angle of about 10° with respect to the forward facing direction.

13. The rowing exercise machine of claim 11 wherein the frame further comprises:

a vertical upright to which the seat connects; and

means for vertically adjusting the seat along the upright.

14. The rowing exercise machine of claim 11 wherein the chest brace is inclined from the horizontal toward the front of the frame.

15. The rowing exercise machine of claim 14 wherein the chest brace is inclined from horizontal at an angle of about 75°.

* * * * *

United States Patent [19]

Jonas et al.

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[45] **Date of Patent: Nov. 14, 1989**

[54] **ROWING MACHINE**

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[52] **U.S. Cl.** **272/72**

[58] **Field of Search** ..... 272/69, 70, 71, 72, 272/73, 128, 132, 134; 74/801; 128/25 R, 25 B

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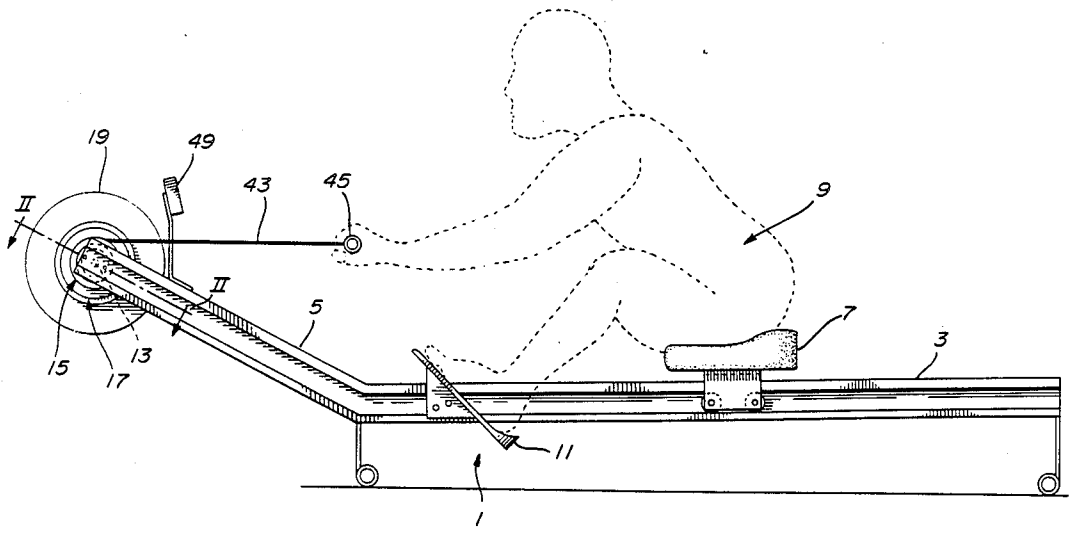
[57] **ABSTRACT**

A frame member has a seat mounted thereon, the seat being movable therealong. The frame member also carries feet rests. A shaft is mounted across the frame member at one end thereof, and a flywheel is mounted on the shaft. A planetary gear system having a rotatable carrier, pinion gears mounted in the carrier, a stationary ring gear and a central gear is mounted on the shaft for rotatably driving the flywheel. The central gear is mounted on the shaft for rotation therewith. A spool is mounted on the carrier for rotation therewith. A cable is wound around the spool for providing rotary motion to the spool when the cable is pulled by an exerciser during the rowing stroke. Thus, the rotary motion of the spool is transferred to the flywheel through the planetary gear system and the shaft in a speed increasing mode.

3 Claims, 2 Drawing Sheets



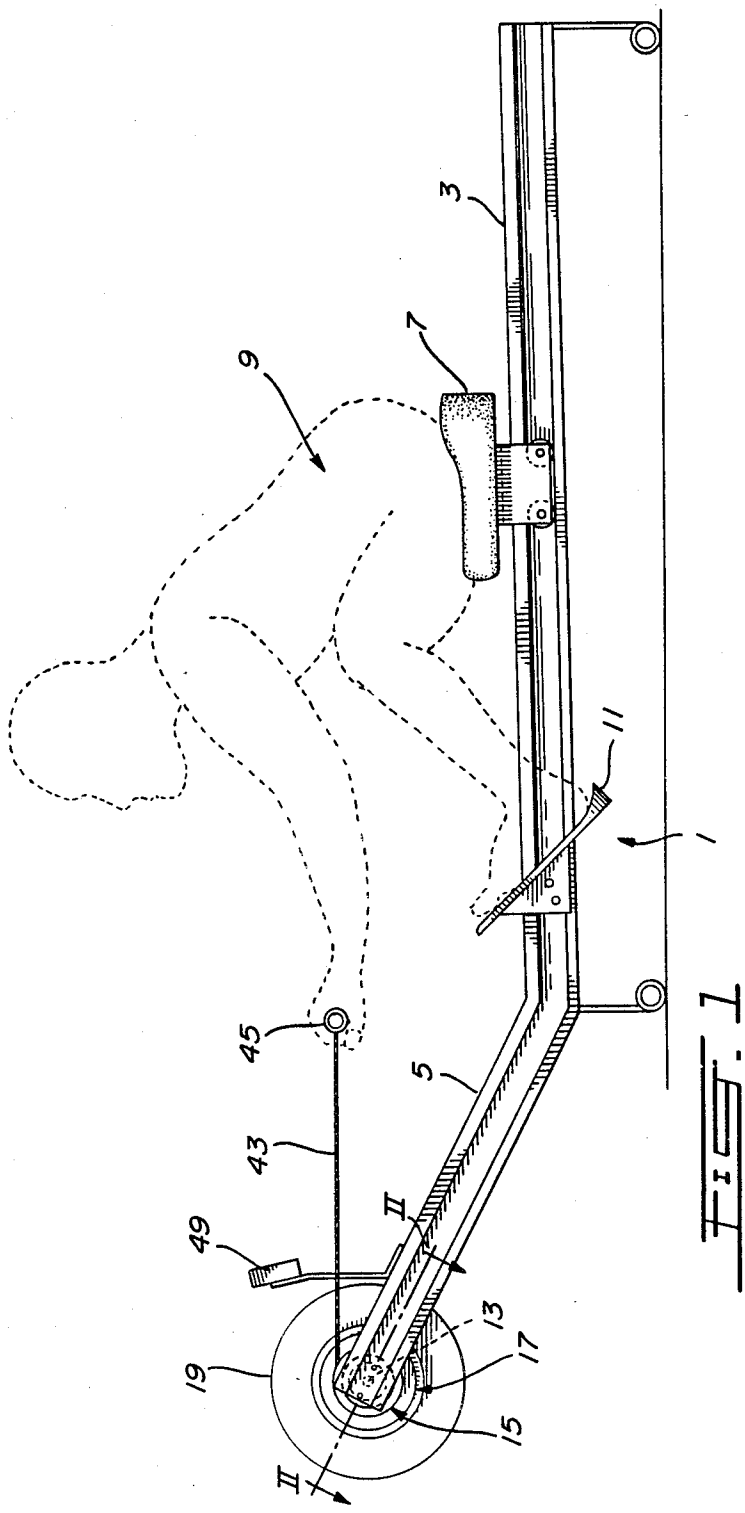


Fig. 1

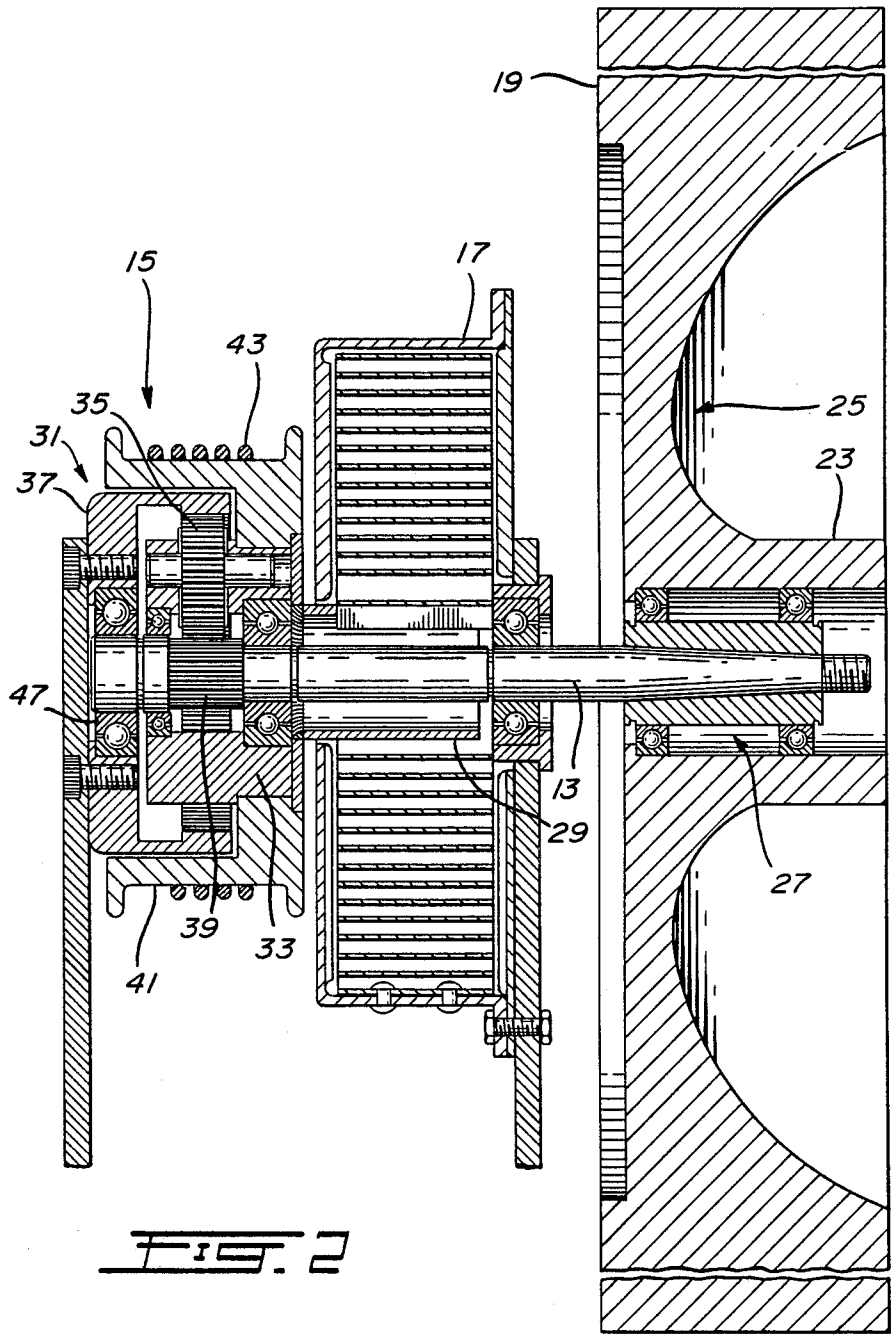


FIG. 2

ROWING MACHINE

BACKGROUND OF INVENTION

1. Field of the Invention

The invention relates to a stationary rowing machine exercising device. More specifically, the invention relates to such a device which simulates the resistance to be overcome in a real-life rowing environment.

2. Description of Prior Art

One such rowing device is illustrated in U.S. Pat. No. 4,396,188, Dreissigacker et al, Aug. 2, 1983, which is exemplary of similar devices also taught in the art. However, it differs from these other devices by using an elastic return means, which is connected to the drive means beyond where the drive means interconnects with a plural gearing means, for returning the handle during the return stroke. In addition, the force for driving the flywheel is applied directly to the shaft of the flywheel without the intervention of either speed increasing or reduction means.

British Patent Application No. 2 175 813A, European Patent Application No. 214-748-A, and U.S. Pat. No. 2,725,231, Hoover, Nov. 29, 1955, also teach rowing machines. However, in these machines, the return means is a spring which is wound up during the rowing stroke and which unwinds to return the drive means during the return stroke.

U.S. Pat. No. 4,452,445, Csekes, June 5, 1984, U.S. Pat. No. 3,964,742, Carnielli, June 22, 1976, and USSR Patent No. 1248-615-A, teach exercising devices which have a rotating shaft connected to foot pedals. The central gear of a planetary gear system is connected to the shaft to rotate therewith, and the carrier of the planetary gear system is connected to an outer wheel, whereby rotary motion of the shaft is transmitted to the outer wheel in a speed reduction mode.

SUMMARY OF INVENTION

It is an object of the invention to provide a stationary rowing machine exercising device which includes a flywheel for simulating resistance to be overcome wherein the means for returning comprises a clock spring mounted on the same shaft as the flywheel.

It is a further object of the invention to provide a stationary rowing machine exercising device which uses a planetary gear system to transmit motion of a drive means to the flywheel through a planetary gear system in a speed increasing mode.

In accordance with the invention there is provided a stationary rowing machine exercising device comprising a frame member and seat means mounted on the frame member and movable therealong. Foot rest means are connected to the frame member so that an exerciser can rest his feet on this foot rest means. A shaft is mounted across the frame at one end thereof. A flywheel is mounted on the shaft. Means for rotatably driving the flywheel are also mounted on the shaft. The means for rotatably driving comprise a planetary gear system having a rotatable carrier, pinion gears mounted in the carrier, a stationary ring gear and a central gear. The central gear is mounted on the shaft for rotation therewith. Spool means are mounted on the carrier for rotation therewith, and cable means are wound around the spool means for providing rotary motion to the spool means when the cable means is pulled by an exerciser during a rowing stroke. Thus, the rotary motion of the spool means is transferred to the flywheel, through the planetary gear system and the shaft, in a speed increasing mode.

BRIEF DESCRIPTION OF DRAWINGS

The invention will be better understood by an examination of the following description, together with the accompanying drawings, in which:

FIG. 1 is a side view of the stationary rowing machine exercising device in accordance with the invention; and

FIG. 2, which is a section through II—II of FIG. 1, illustrates the drive means and the return means in accordance with the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Turning now to the drawings, the exercising device comprises a frame, illustrated generally at **1**, and including a horizontally extending portion **3** and an upwardly extending portion **5**. Seat **7** is mounted on the horizontally extending portion **3** and is movable therealong. An exerciser **9** seats himself on the seat **7** and supports his feet in feet rests **11**.

Extending across the outer end of the upwardly extending portion **5** is a shaft **13** (see also FIG. **2**). Mounted on the shaft **13** are a means **15** for driving flywheel **19** and a means **17** for returning the flywheel **19** as will be described below.

The flywheel **19** comprises a plurality (eight shown in the drawings) of blades **21** to **21K** disposed with equal increment around the flywheel **19**. As will be appreciated by one skilled in the art, the flywheel **19** will present resistance to rotation to simulate the resistance experienced when driving oars through water.

Turning now to FIG. **2**, flywheel **19** has, at the center thereof, a hub **23** and, in the sides of the vanes or blades **21** to **21K** thereof, a circular indent **25** and supporting bearings on either side. Mounted in the hub **23** is a one-way clutch **27**. The free end of shaft **13** is connected to the flywheel through the one-way clutch **27**. The one-way clutch **27** will connect the shaft **13** to the flywheel **19** for rotation therewith during a rowing stroke, but will disengage the shaft **13** from the flywheel **19** during a return stroke so that the flywheel **19** will not rotate with the shaft **13** during the return stroke.

Spring **17** also includes a hub **29** which is connected to carrier **33** for rotation therewith. During the rowing stroke, the spring **17**, which preferably comprises a clock spring, will "wind up". Accordingly, during the return stroke, the spring will unwind to return the means for driving as will be described below.

The means **15** for driving the flywheel **19** comprises a planetary gear system, illustrated generally at **31**, and including a carrier **33** which carries pinion gears **35** (usually **3**). The teeth on the pinion gears **35** mesh with the teeth of an inner gear on ring gear **37**, and also with the teeth on central gear **39**. Central gear **39** is connected to shaft **13** for rotation therewith.

Mounted on the carrier **33** for rotation therewith is a spool **41**, and cable **43** is wrapped around the spool **41**. As seen in FIG. **1**, the free end of the cable **43** is connected to a handle **45** which is grasped by the exerciser and pulled by him to rotate spool **41**.

The end of shaft **13** is mounted in a bore of the ring gear **37** on bearings **47** so that the shaft rotates relative to the ring gear **37**, i.e., the ring gear **37** is stationary relative to the shaft **13**.

In operation, the exerciser grasps the handle **45** and, in simulation of a rowing stroke, pulls the cable **43** in the direction of the arrow A unwinding the cable **43** from the spool **41**. The spool **41** will accordingly rotate in a clockwise direction in FIG. **1**.

Rotation of the spool **41** will cause a similar rotation of carrier **33**, which is connected to the spool **41**, causing the centers of the pinion gears **35** to rotate, with the carrier **33**, about the axis of the carrier **33**. During the rotation of the centers of the pinion gears **35**, and because the teeth of the pinion gears **35** engage the inner teeth of the stationary ring gear **37**, the pinion gears **35** will also rotate about their own axis in a counter-clockwise direction.

The rotation of the pinion gears **35** about their own axis will cause the central gear **39** to also rotate, in a clockwise direction, because of the meshing between the teeth of the pinion gears **35** and the teeth of the central gear **39**. As the central gear **39** is attached to the shaft **13**, the shaft **13** will also rotate in a clockwise direction. Thus, the rotary motion of the spool is transferred to the shaft **13**.

Because the size of central gear **39** of the shaft **13**, relative to the sizing of pinion gears **35** and ring gear **37**, the shaft **13** will rotate at a greater speed than the spool **41**. In a specific embodiment, there is a 6:1 increase in rotary speed from the spool **41** to the shaft **13**.

One-way clutch **27** is adapted to engage when shaft **13** rotates in a clockwise direction, and to disengage when shaft **13** rotates in a counter-clockwise direction. Thus, flywheel **19** will be connected to shaft **13** when the exerciser is pulling cable **43** in the direction of arrow A, i.e., during a rowing stroke.

At the same time, when shaft **13** is rotating in a clockwise direction, spring **17** is being wound up.

When the end of the rowing stroke is reached, the exerciser leans forward in the direction opposite to the arrow A. Release of force on the cable **43** will permit spring **17** to unwind thus driving carrier **33** in a counter-clockwise direction. When the carrier **33** is rotating in the counter-clockwise direction, the pinion gears **35** will rotate to drive central gear **39**, and therefore shaft **13**, in the counter-clockwise direction.

When shaft gear **13** rotates in the counter-clockwise direction, clutch **27** disengages so that flywheel **19** does not follow the counter-clockwise rotation.

At the same time, the counter-clockwise rotation of carrier **37** is transmitted to spool **41** so that cable **43** will be rewound on spool **41**.

When the end of the return stroke is reached, the exerciser will once again pull the cable **43** in the direction of arrow A in a rowing stroke, etc.

Because the rotary motion of the spool **41** is transferred to the flywheel **19** in a speed increasing mode during the rowing stroke, a smaller flywheel can be used. Accordingly, this arrangement is especially useful for a private home exercising device.

In addition, it simulates a real-life rowing environment in that the amount of force needed to increase speed at a high speed level is greater than the amount of force required to increase speed at a low speed level. That is, the force required to increase the speed from 900 revolutions per minute to 1000 revolutions per minute is greater than the force required to increase the speed from 100 revolutions per minute to 200 revolutions per minute even though the increment is the same in both cases. This is similar to the situation as it exists in a real-life rowing environment.

Thus, in a sense, the apparatus is self-adjusting in that, when the exerciser pulls harder, to thereby provide a higher rotational speed of the spool **41**, he meets more resistance to counter his greater efforts. This is in contrast to exercising devices which use friction brakes set at a specific level. With the friction brake arrangement, a greater output of effort by the exerciser will not cause a greater resistance to that effort.

It is also contemplated, in accordance with the invention, to provide means **49** for displaying the speed of the flywheel. The means **49** can, for example, comprise a tachometer or other such means as is well known in the art.

Although a particular embodiment has been described, this was for the purpose of illustrating, but not limiting, the invention. Various modifications, which will come readily to the mind of one skilled in the art, are within the scope of the invention as defined in the appended claims.

We claim:

1. A stationary rowing machine exercising device, comprising:

a frame member;

seat means mounted on said frame member and movable therealong;

feet rest means connected to said frame member;

a shaft mounted across said frame at one end thereof;

a flywheel mounted on said shaft;

means for rotatably driving said flywheel mounted on said shaft;

said means for rotatably driving comprising:

(i) a planetary gear system comprising:

(a) a rotatable carrier;

(b) pinion gears mounted in said carrier or on said carrier;

(c) a stationary ring gear;

(d) a central gear;

said pinion gears meshing with said central gear and said stationary ring gear;

(ii) said central gear being mounted on said shaft for rotation therewith;

(iii) spool means mounted on said carrier for rotation therewith;

(iv) cable means wound around said spool means for providing rotary motion to said spool means when said cable means is pulled by an exerciser during a rowing stroke;

whereby, said rotary motion of said spool is transferred to said flywheel, through said planetary gear system and said shaft, in a speed increasing mode.

2. A device as defined in claim **1** and further including a spring connected to said carrier;

whereby, said spring is wound up during said rowing stroke; and

said spring is unwound during a return stroke to rotate said carrier in a direction opposite to the direction of rotation of said carrier during said rowing stroke whereby to rewind said cable means on said spool during said return stroke.

3. A device as defined in claim **2** wherein said flywheel comprises a central hub;

a one-way clutch in said central hub;

said shaft being disposed in said one-way clutch;

whereby, during said rowing stroke, said one-way clutch is engaged so that said shaft is connected to said flywheel and said flywheel rotates with said shaft; and

during said return stroke, said clutch is disengaged so that said flywheel is disconnected from said shaft and does not rotate with said shaft during said return stroke.

* * * * *

US007766802B2

(12) **United States Patent**
Webber et al.

(10) **Patent No.: US 7,766,802 B2**
(45) **Date of Patent: Aug. 3, 2010**

(54) **ROWING EXERCISE MACHINE WITH SELF-ALIGNING PIVOTING USER SUPPORT**

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(73) Assignee: **Hoist Fitness Systems, Inc.**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 97 days.

(21) Appl. No.: **12/105,833**

(22) Filed: **Apr. 18, 2008**

(65) **Prior Publication Data**

US 2008/0214365 A1 Sep. 4, 2008

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/633,805, filed on Aug. 4, 2003, now Pat. No. 7,594,880.

(51) **Int. Cl.**
A63B 21/00 (2006.01)

(52) **U.S. Cl.** **482/100**; 482/136; 482/72

(58) **Field of Classification Search** 482/100, 482/136, 137, 139, 72, 73, 94–97, 130
See application file for complete search history.

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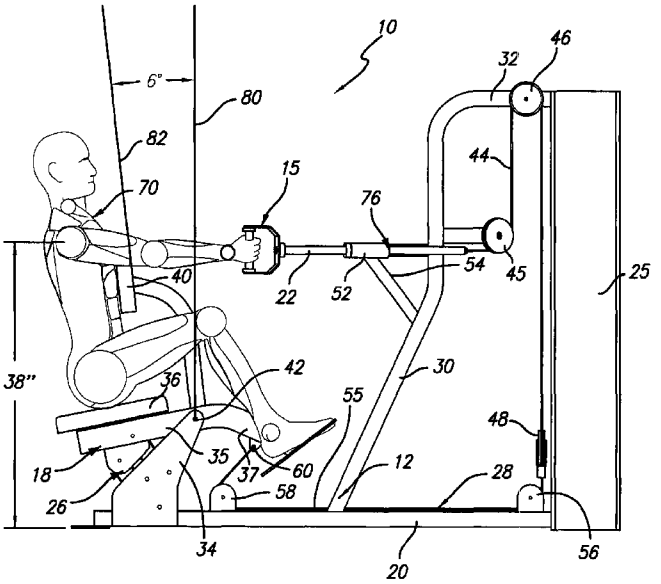
Primary Examiner—Jerome Donnelly
(74) *Attorney, Agent, or Firm*—Procopio, Cory, Hargreaves & Savitch LLP

(57) **ABSTRACT**

A rowing or mid-row exercise machine has a main frame and a user support frame pivotally mounted relative to the main frame for rotation between start and end positions. The user support frame supports spaced positions on a user's body in the same relative orientation throughout an exercise movement. A user engagement device is movably mounted relative to the frames and has at least one handle gripped by the user in performing exercises. The handle is movable in a predetermined rowing exercise path between a start position spaced in front of a user's chest and an end position closer to the chest. A connecting linkage translates movement of the user engagement device to rotational movement of the user support frame. A load resists movement of at least one of the user support, user engagement device, and connecting linkage.

56 Claims, 11 Drawing Sheets



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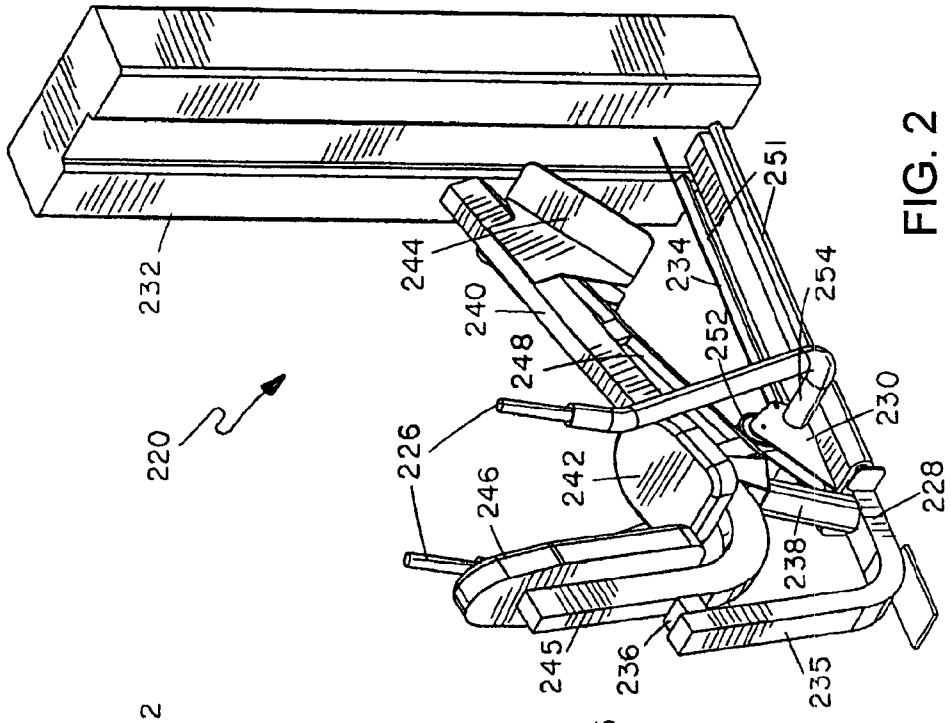
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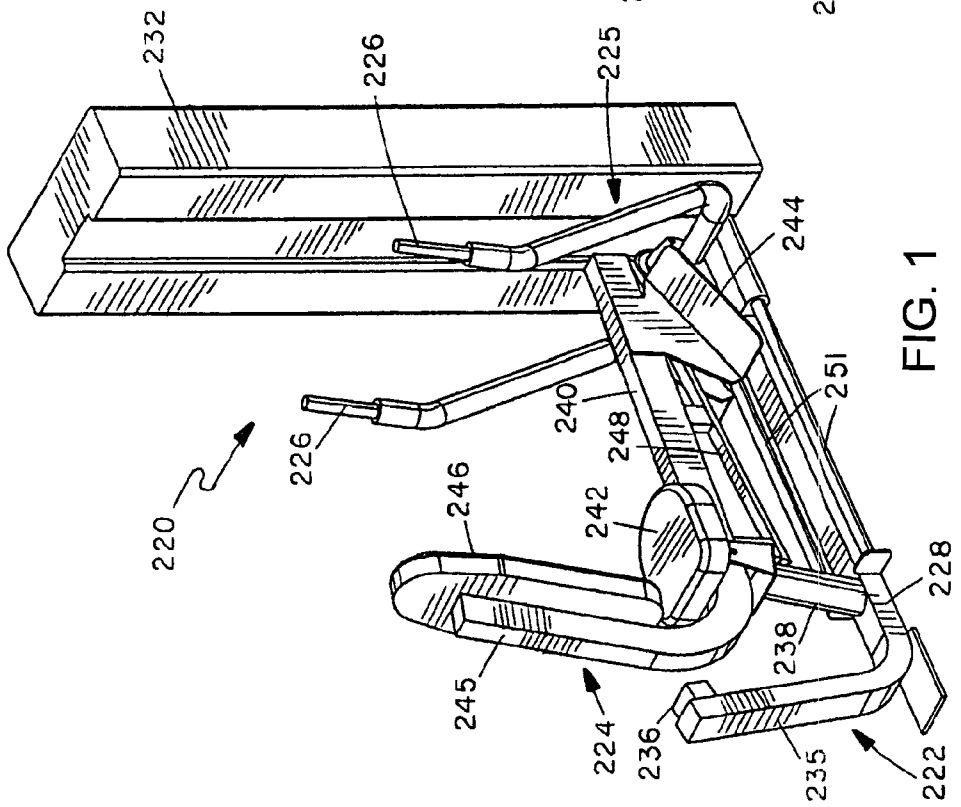
FIG. 2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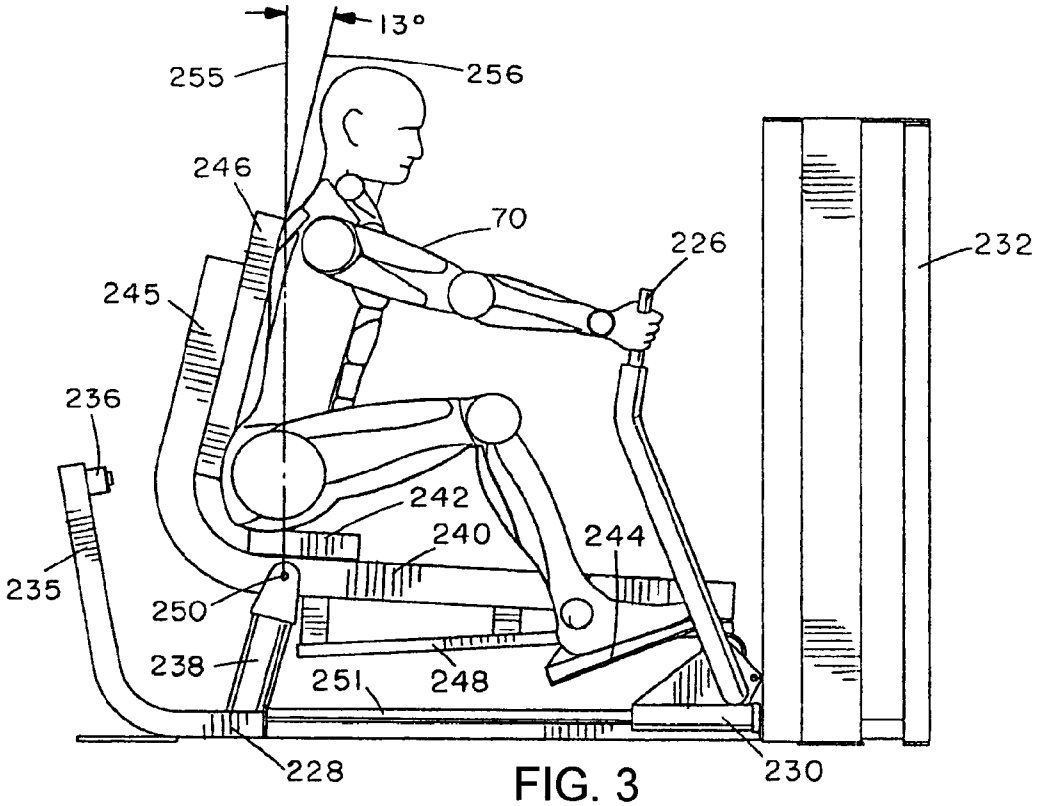
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FIG. 3

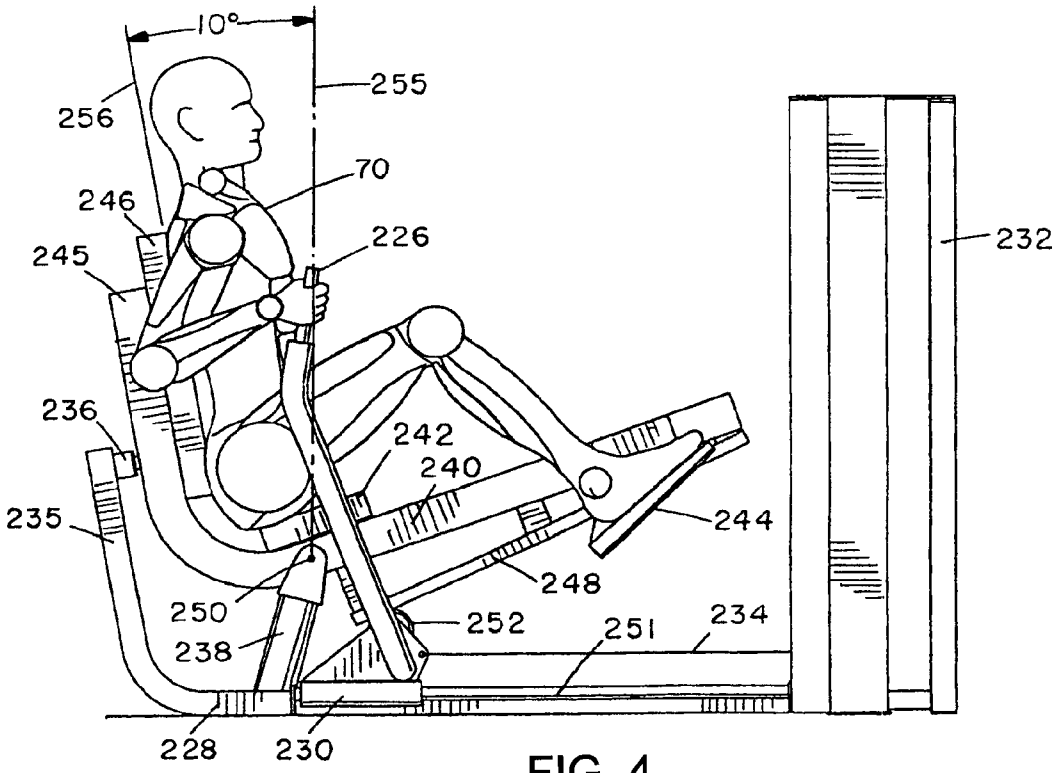
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FIG. 4

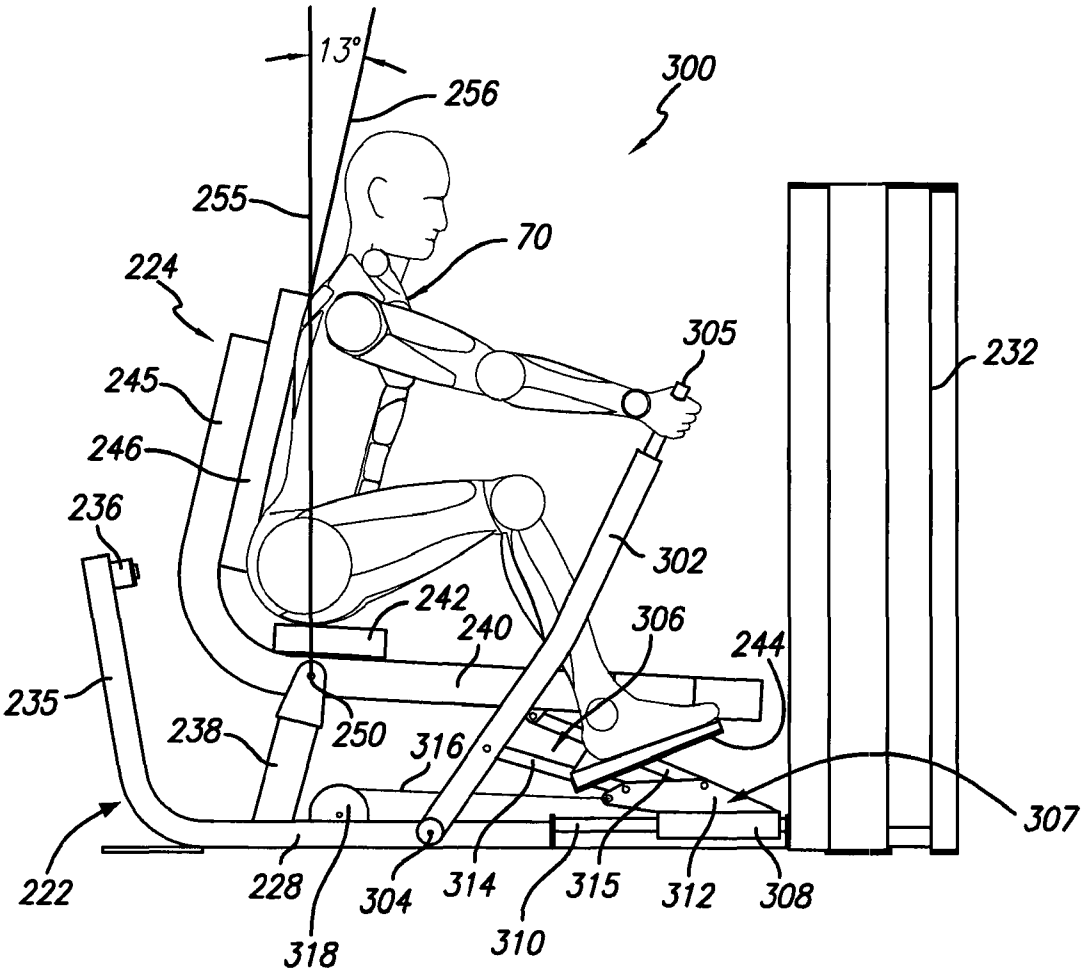
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FIG. 5

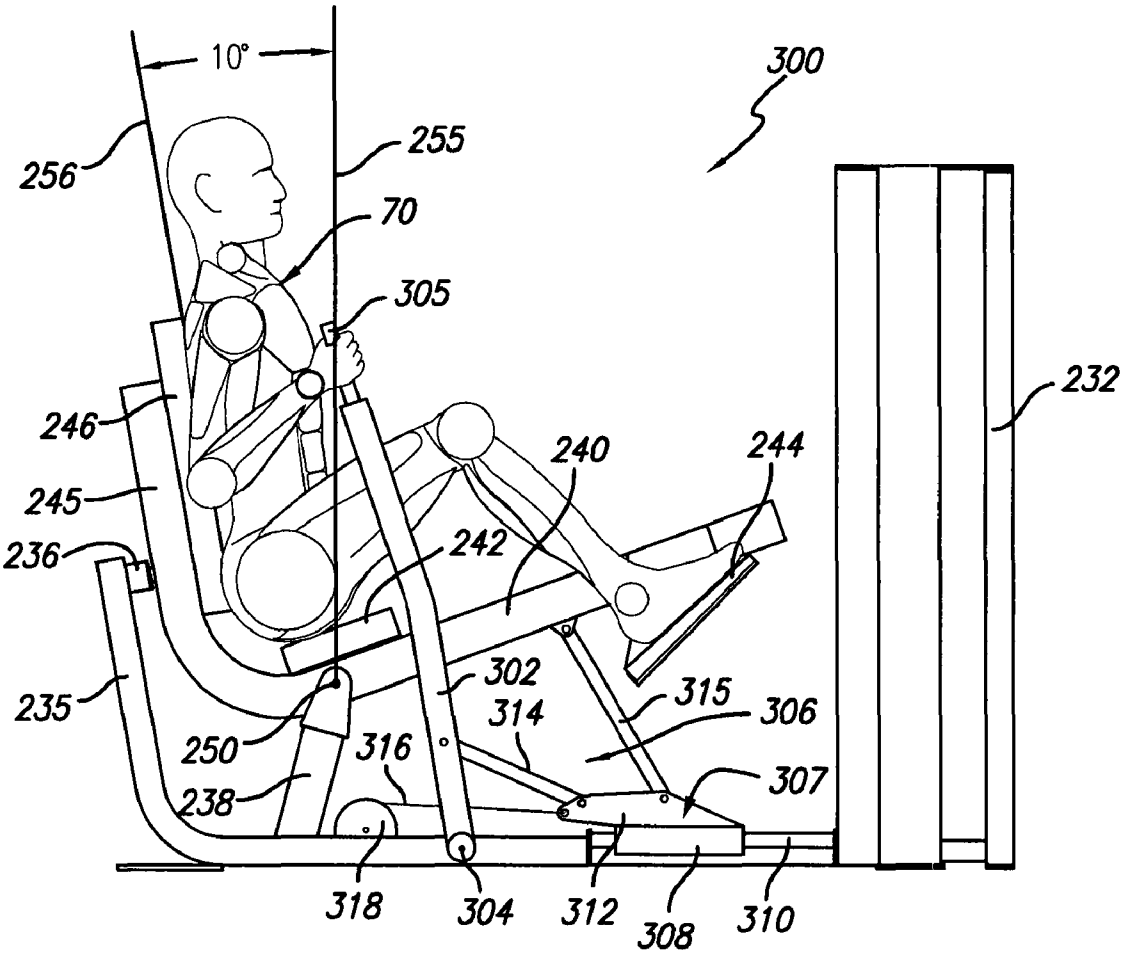
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FIG. 6

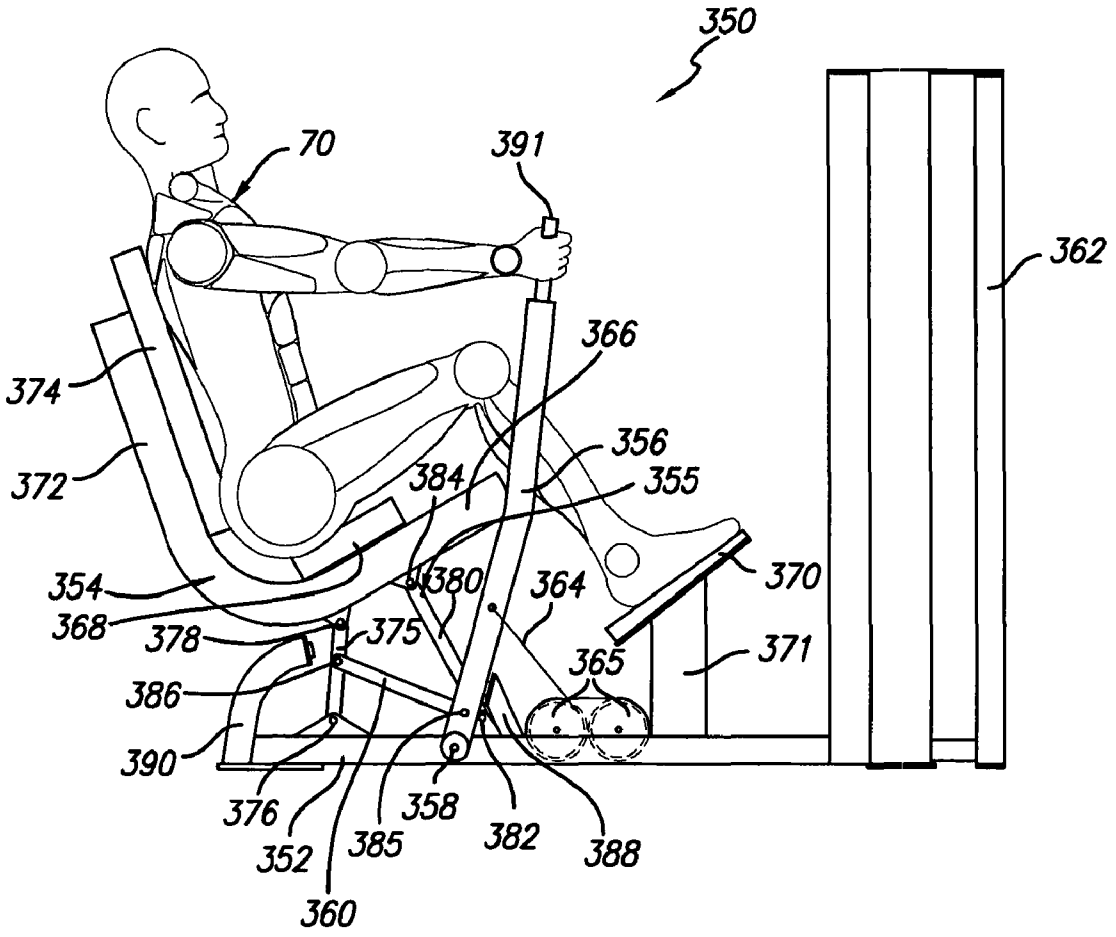
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FIG. 7

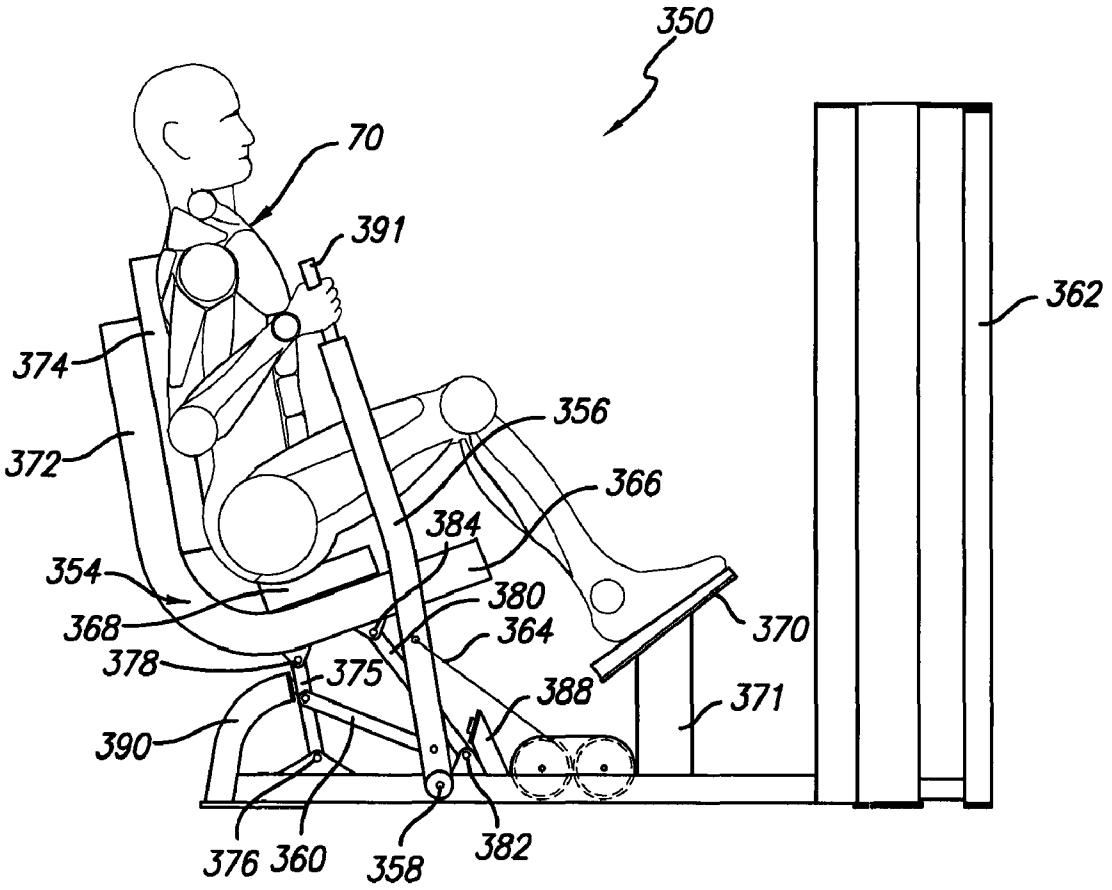
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FIG. 8

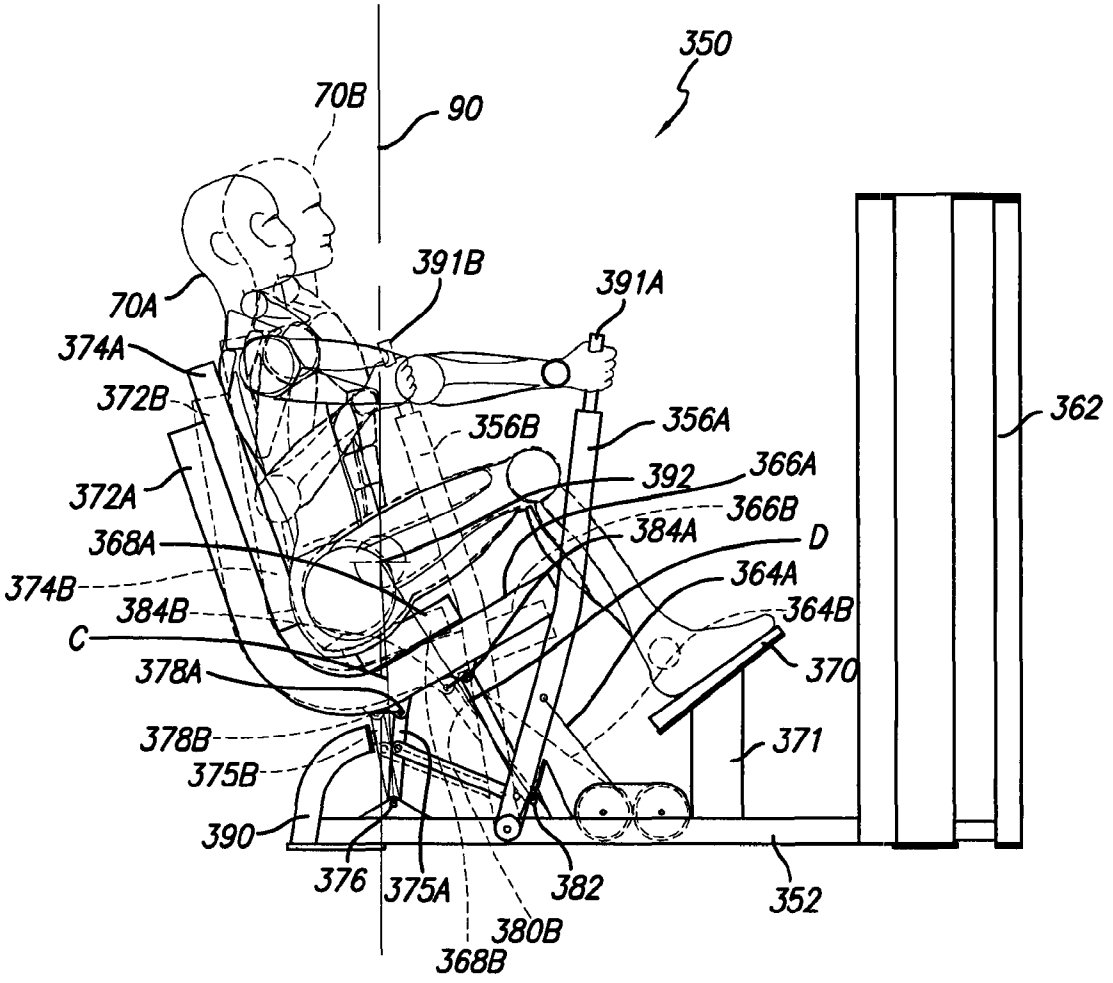
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FIG. 9

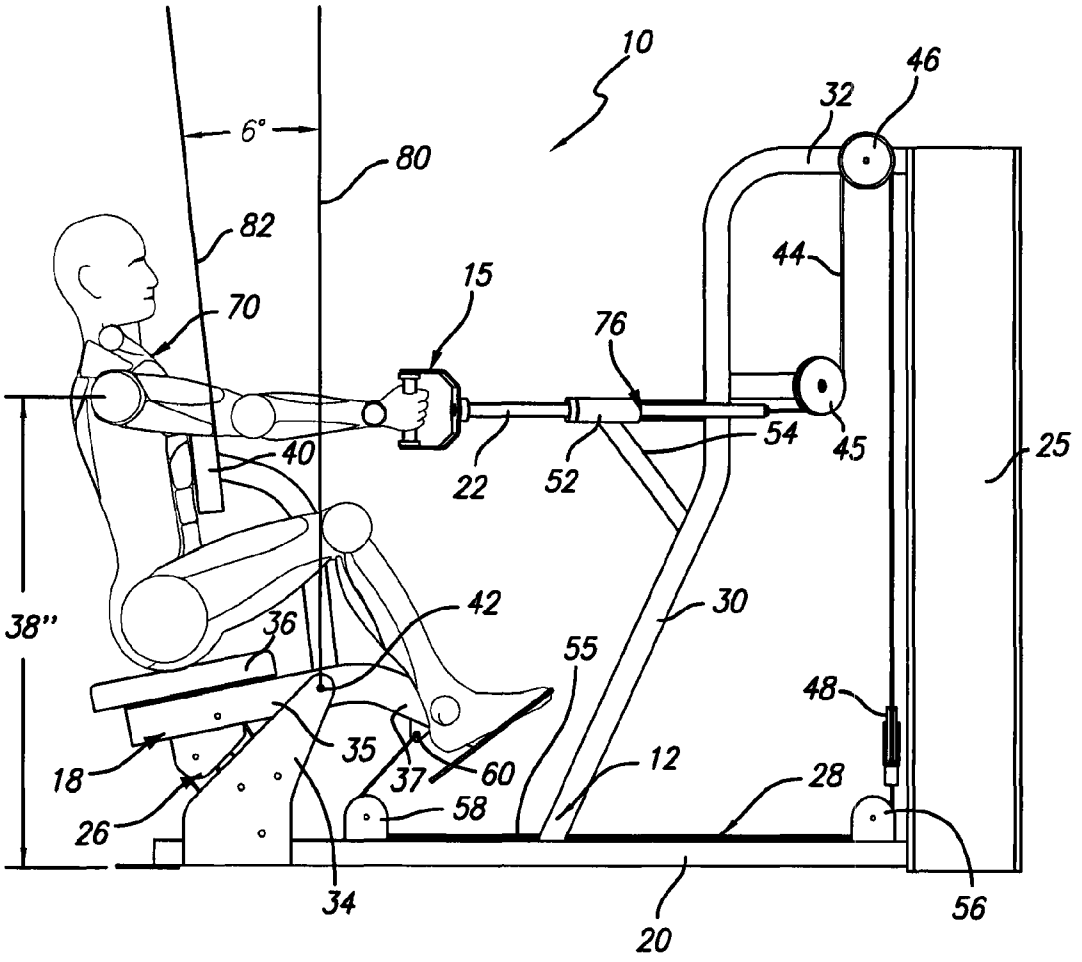
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FIG. 10

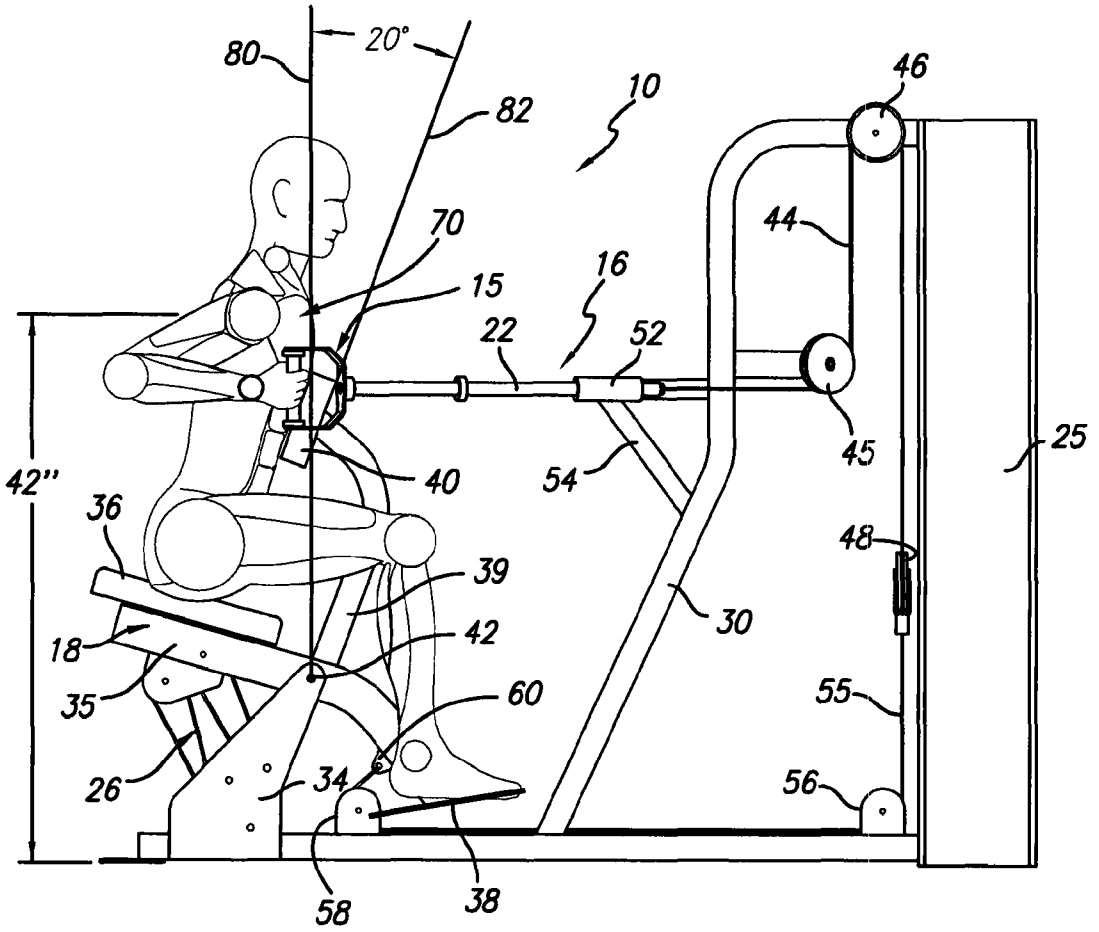
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FIG. 11

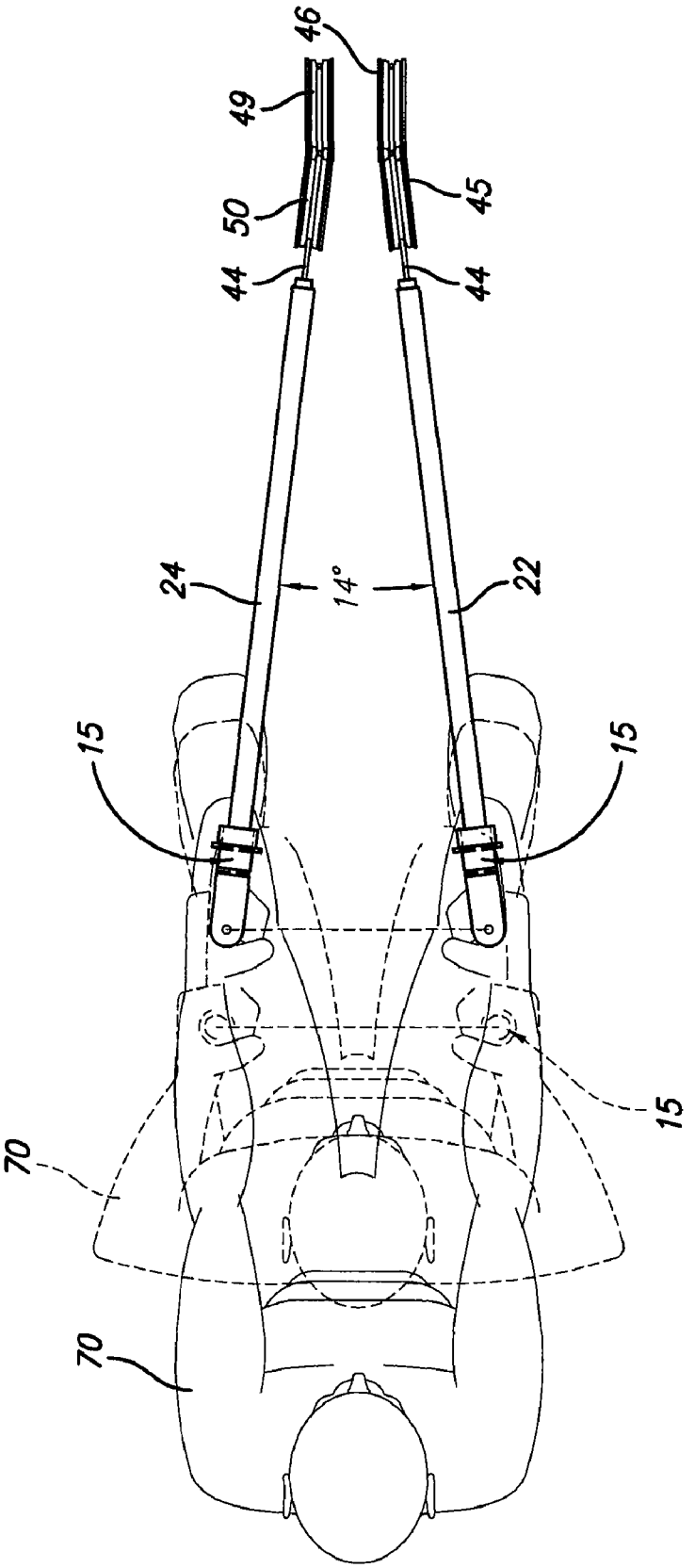

FIG. 12

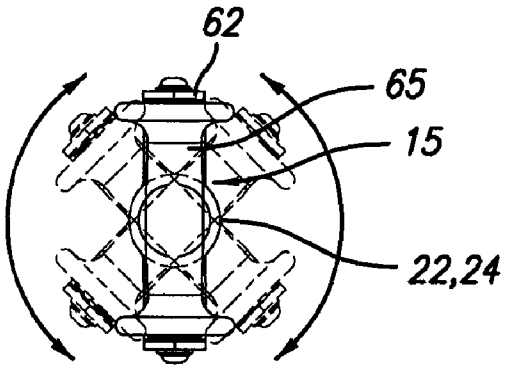

FIG. 13A

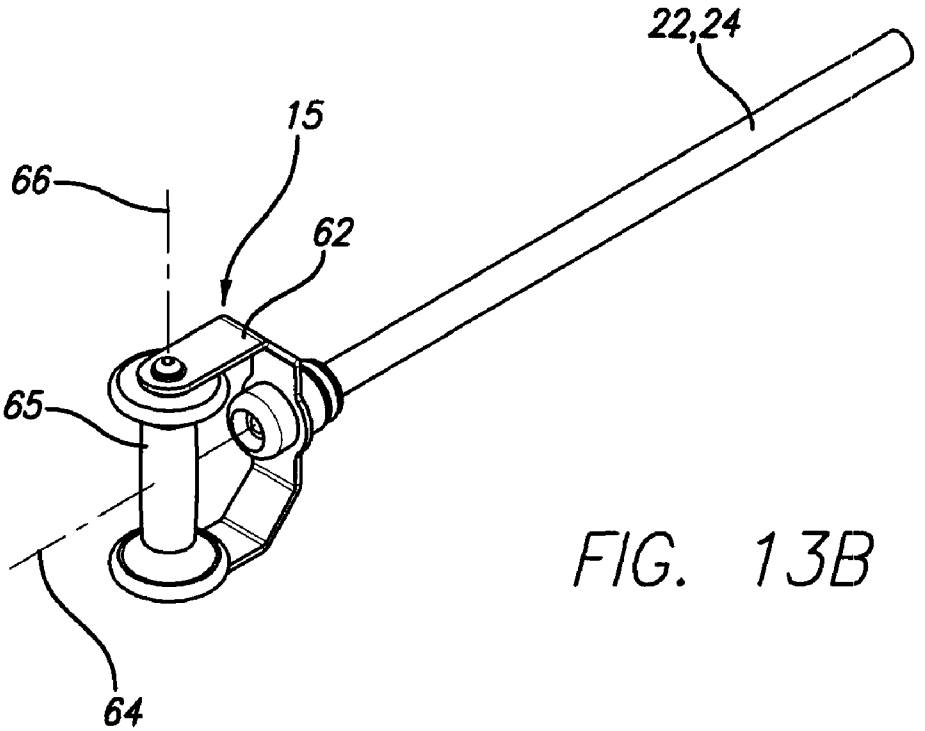

FIG. 13B

ROWING EXERCISE MACHINE WITH SELF-ALIGNING PIVOTING USER SUPPORT

RELATED APPLICATION

The present application is a Continuation-In-Part of co-pending U.S. patent application Ser. No. 10/633,805 filed on Aug. 4, 2003, the contents of which are incorporated herein by reference in their entirety.

BACKGROUND

1. Field of the Invention

This invention relates generally to exercise machines, and is particularly concerned with a rowing exercise machine with a pivoting user support.

2. Related Art

There are several different types of exercise for exercising back muscles, including mid-row exercises. These exercises can be difficult for many people to perform using free weights, requiring balance and coordination as well as strength to follow the proper movement path. Free rowing exercises often require an exerciser to bend at the waist, which is undesirable. Improper form by the exerciser can make the exercise more difficult, increase stress on the joints, and even lead to possible injury.

Various exercise machines have been developed for performing rowing and other exercises. Some of these have a stationary user support, while others have a pivoting or movable user support, which may or may not be linked to the exercise arm or user engagement means. One problem in most or all prior art designs is the unnatural and exaggerated arcing movement found in pivoting arm exercise machines, which do not accurately simulate the natural body movement found in free weight and/or free bar exercises.

Movable user supports linked to the movement of an exercise arm are extremely common in exercise machines for performing many different exercises, and are generally known as composite motion exercise machines. U.S. Pat. No. 2,252,156 of Bell and U.S. Pat. No. 6,251,047 of Stearns show bicycle and exercise bike designs in which a seat or user support is linked to an exercise arm or crank and pedal system to provide up and down movement to the seat. The most common application of movable user supports is found in rowing and horse riding type exercise machines, which use the weight of the user as the exercise resistance. In U.S. Pat. No. 3,446,503 of Lawton, U.S. Pat. No. 4,743,010 of Geraci, and U.S. Pat. No. 5,342,269 of Huang, a seat and exercise arm are pivotally mounted on the base frame, with the seat linked to the exercise arm for dependent movement. U.S. Pat. No. 4,300,760 of Bobroff, U.S. Pat. No. 5,299,997 of Chen, U.S. Pat. No. 5,356,357 of Wang, U.S. Pat. No. 5,453,066 of Richter, U.S. Pat. No. 5,458,553 of Wu, U.S. Pat. No. 5,503,608 of Chang and U.S. Pat. No. 5,507,710 of Chen all show horse riding type exercise machines. They all consist of a user support pivotally attached to a base frame, and one or more exercise arms pivotally connected to the frame and pivotally linked to the user support.

U.S. Pat. No. 6,264,588 of Ellis shows a composite motion movement machine that has a moving exercise arm linked to a movable user support, and a pivoting truck system which is slidably connected to rails mounted both on the main frame and user support. The movable user support and exercise arm are both pivoted at the same point on the base frame, in front of the user support. A belt connects the exercise arm to the truck. When the exercise arm is pushed or pulled, the belt pulls the truck along the rails, forcing the user support to rotate about its pivotal connection to the frame. This design puts all of the user's weight on one side of the pivot, producing a high initial lifting resistance when the user starts the exercise, and also has no means for properly aligning the exercise arm and user support during the exercise movement.

Movable seats linked to exercise arms have also been used in multi-purpose exercise machines, such as U.S. Pat. No. 5,330,405 of Habing, U.S. Pat. No. 5,334,120 of Rasmussen, U.S. Pat. No. 5,669,865 of Gordon, U.S. Pat. No. 5,733,232 of Hsu, and U.S. Pat. No. 6,244,995 of Prsala. In U.S. Pat. No. 5,330,405 of Habing, a lever arm is pivotally connected to the base frame and supports a movable sub-frame including a user support which is also pivotally connected to the stationary base frame. An exercise arm is pivotally mounted on the sub-frame and linked to the lever arm via cables and pulleys, so that movement of the exercise arm pulls the cables lifting the lever arm, and causing the sub-frame to pivot about its connection to the base frame and rise against the weight of the user. U.S. Pat. No. 5,733,232 of Hsu shows another multi-purpose exercise machine with a pivoting seat, but in this case the back pad is stationary and only the seat pad is pivoted. Thus, the seat travels in an arcuate path without any secondary stabilization for the user, forcing the user to try to maintain their balance on the seat as it arcs upward. Also, in this design, the pivot point for the seat is located at a spacing behind the user position, so that all of the user's weight opposes the user when starting an exercise from rest. Neither of these machines has any capability for aligning the user and user support with a rigid exercise arm, and thus do not maintain or support the user in the proper position throughout the exercise.

Gordon shows a multi-purpose exercise machine that has a hinged, two-piece user support that folds and unfolds with each exercise repetition, so that the seat and backrest move relative to one another and additional support such a footrest, safety belts and thigh gripping surfaces are required to keep the user properly and safely positioned in the user support. Because most of the combined weight of the user and user support remain on one side of the user support's gravitational centerline, this weight is used as partial exercise resistance.

Current exercise machines with pivoting or movable user supports often do not accurately maintain proper positioning of the user throughout the exercise motion, can result in awkward hand or wrist positions, and often involve exaggerated and unnatural arcing movements, or linear, non-arcing arm movements, rather than the smaller elliptical movement associated with free weight or natural exercise movements. There is no provision for proper positioning of the user relative to the position of the user engaging portion of the exercise arm throughout the entire exercise motion. Often, an awkward starting or finishing position is required, potentially causing strain or injury.

SUMMARY

Embodiments described herein provide for a rowing exercise machine with a pivoting user support.

A rowing or mid-row exercise machine in one embodiment comprises a floor engaging main frame, a user support frame pivotally associated with the main frame, a user engagement device movably mounted on one of the frames for actuating by a user in order to perform a rowing exercise, and a connecting linkage which links movement of the user engagement device to movement of the user support. A load provides resistance to movement of the user support frame, user engagement device and/or connecting linkage. The connecting linkage, user support pivot, and user engagement device

mount are arranged so that movement of the user engagement device results in self-aligning movement of the user support. In one embodiment, the user engagement device has at least one exercise arm which is at least partially rigid and has a handle gripped by a user when performing a rowing exercise, the handle moving in a predetermined exercise path from a start position spaced in front of the user's chest to an end position drawn in closer to the user.

The user support frame in an exemplary embodiment has both a primary user support, such as a seat pad or back pad, and a secondary user support, such as a back pad, shoulder pad, thigh hold-down pads, chest pad, or the like. It may also have a supplementary stabilization means such as a foot rest, which may be mounted on, and travel with, the user support frame. Alternatively, a foot rest may be mounted on the main frame. In either case, the foot rest provides additional stabilization to the user, helping them to maintain a proper exercise position and providing additional comfort and support. The use of multiple support pads on the user support frame helps to position the exerciser properly and safely. These supports are in fixed alignment to each other and travel together, keeping the user in the same braced position throughout the entire exercise range of motion. This allows the user to focus on the exercise rather than worrying about their positioning on a moving platform or seat.

The exercise arm or user engagement device is movably mounted on the main frame, the user support frame, or the connecting linkage. The connecting linkage translates movement of the exercise arm to movement of the user support, and is movably engaged with at least two of the main frame, exercise arm, and user support. In one embodiment, the user engagement device is movably mounted on the main frame and associated with the connecting linkage. The user support and exercise arm may both be movably mounted on the main frame, with the connecting linkage connected between them. The exercise arm may be mounted for linear movement or may be pivotally mounted for rotational movement.

The user support frame may be pivotally mounted on the base of the main frame so that it is relatively low to the ground and readily accessible to the user in entering and exiting the machine, via a single pivot or a multiple pivot assembly. In one embodiment, the user engagement device is also movably mounted on the base of the main frame. In other embodiments, the user engagement device is movably mounted relative to an upright portion of the main frame. The user engagement device may comprise completely rigid or partially rigid exercise arms with handles for gripping by the user which are movable between a start position spaced forwardly from the user's chest and an end position which is drawn in just in front of the user's chest. The user's hands may be at a slightly lower elevation relative to the shoulders in the end position than in the start position. The movement mimics the slight, naturally arcing movement of the upper body when rowing without any bending at the waist, which is undesirable and can occur with a free rowing exercise.

A pivot assembly which pivotally supports the user support frame may be located beneath the frame. The connecting linkage may be rigid, flexible, or partially flexible, and may be adjustable in length or position. The user engagement device or exercise arm may have one or two handles. If handles are provided, they may be rigid or flexible, fixed or self-aligning, and may provide two dimensional or three dimensional hand movement.

The handles and associated exercise arms may be movable independently or in unison. In one embodiment, the user engagement device and connecting linkage are both movably associated with the main frame. The user engagement device may be a bi-directional exercise arm.

In some embodiments, the end position of the user support frame is inclined rearward relative to the start position, while in others the end position is inclined forward relative to the start position. In one embodiment, the primary support is a seat pad which may be horizontal or inclined in the start position. The seat pad is rearwardly inclined in an exercise start position in one embodiment, and is moved through a horizontal orientation to a different inclined position in the exercise end position. In another embodiment, the seat pad is forwardly inclined in the start position and rearwardly reclined in the end position. In another embodiment, the seat pad does not travel through a horizontal orientation but is rearwardly reclined in the start position and ends in a position which is rotated forward relative to the start position but still rearwardly reclined. The secondary support may comprise an upright support pad for the user's back or chest. Because the user support moves in conjunction with the exercise arm or user engagement device, the arcuate path of the exercise arm relative to the user support is reduced. The result is a more natural feeling exercise movement that more closely replicates the movement found in the corresponding free weight exercise.

The pivot mounting of the user support defines a vertical gravitational center line of the pivotal movement, and in one embodiment portions of the combined weight of the user and user support frame are positioned on both sides of the vertical gravitational center line in at least one of the start and end positions of the exercise. In one embodiment, a portion of the combined weight of the user and user support is positioned on the movement side (i.e. the side the user support is pivoting towards) of the gravitational center line in the start position. This reduces the initial lifting resistance. By finishing the exercise with a portion of the combined user and user support weight on the trailing side of the center line in the movement direction, resistance "drop-off" at the end of an exercise is reduced. This distribution reduces the effect of the user's body weight on the resistance felt during the exercise. This is the opposite of most exercise devices that have moving user supports, which tend to rely on the weight of the user for resistance. Whether it is the starting or the finishing position, most prior art pivoting user supports place the majority of the user's weight on one or the other side of the gravitational center line of the pivoting movement, resulting in either a high initial lifting resistance, or else a resistance "drop off" at the end of the exercise.

The exercise resistance or load may comprise a weight stack, weight plates mounted on pegs, or other types of resistance such as hydraulic, pneumatic, electromagnetic, or elastic bands, and may be associated with any of the moving parts, i.e. the user support frame, exercise arm, or connecting linkage.

BRIEF DESCRIPTION OF THE DRAWINGS

The details of the present invention, both as to its structure and operation, may be gleaned in part by study of the accompanying drawings, in which like reference numerals refer to like parts, and in which:

FIG. **1** is a rear perspective view of a rowing or mid-row exercise machine according to one embodiment, with the machine illustrated in a start position adopted at the beginning of an exercise movement;

FIG. **2** is a rear perspective view similar to FIG. **1**, illustrating the machine in an exercise end position;

FIG. **3** is a side elevation view of the machine of FIGS. **1** and **2**, with a user seated on the machine in the start position adopted at the beginning of the exercise;

FIG. **4** is a side elevation view similar to FIG. **3**, illustrating the user and machine in the end position of the exercise;

FIG. **5** is a side elevation view of a mid-row exercise machine according to another embodiment, with a user seated on the machine in the start position adopted at the beginning of the exercise;

FIG. **6** is a side elevation view of the mid-row exercise machine of FIG. **5** with the user and machine in the end position of the exercise;

FIG. **7** is a side elevation view of a mid-row exercise machine according to another embodiment, with a user seated on the machine in the start position adopted at the beginning of the exercise;

FIG. **8** is a side elevation view of the mid-row exercise machine of FIG. **7** with the user and machine in the end position of the exercise;

FIG. **9** is an overlapping side elevation view illustrating the start and end positions of FIGS. **7** and **8** superimposed;

FIG. **10** is a side elevation view of another embodiment of a mid-row exercise machine in an exercise start position with a user seated on the machine;

FIG. **11** is a side elevation view similar to FIG. **10** but illustrating the end position of the exercise;

FIG. **12** is a top plan view of the user and the user engaging handle part of the machine of FIGS. **10** and **11** with the start and end position of the user and user engaging handles shown superimposed;

FIG. **13**A is an end elevation view of one of the handles of the machine of FIGS. **10** to **12** illustrating adjustment of the hand grip orientation; and

FIG. **13**B is a perspective view of a handle arm of the machine of FIGS. **10** to **12**, illustrating the perpendicular pivot axes of the articulating handle.

DETAILED DESCRIPTION

Certain embodiments as disclosed herein provide for a rowing exercise machine having a stationary main frame as well as an exercise arm or user engagement device and user support frame which travel in a dependent relationship. The user engagement device has one or more handles which are gripped by the user and arm portions movably linking the handles to one of the user support, main frame or a connecting linkage which translates movement of the handles into movement of the user support.

After reading this description it will become apparent to one skilled in the art how to implement the invention in various alternative embodiments and alternative applications. However, although various embodiments of the present invention will be described herein, it is understood that these embodiments are presented by way of example only, and not limitation.

FIGS. **1** to **4** illustrate a mid row exercise machine **220** according to one embodiment, for performing a rowing exercise. FIG. **1** illustrates the machine in a start position while FIG. **2** illustrates the finish position, with FIGS. **3** and **4** illustrating the same positions with a user **70** performing the exercise.

The exercise machine **220** comprises a main frame **222** and a user support **224** pivotally mounted on the frame. A U-shaped user engagement device or exercise arm **225** with handles **226** at its free, upper ends is slidably mounted on the base **228** of the frame **222** via linear slide or carriage **230**. The linear slide **230** is linked to an exercise resistance, in this case a weight stack in housing **232**, via a cable and pulley linkage, most of which is concealed within the weight stack housing, with the cable **234** of the linkage connected to the slide **230** as indicated in FIG. **2**. The linear slide or sliding wedge **230** is also linked to the underside of the user support **224**, as described in more detail below, and forms part of a connecting linkage which translates movement of the exercise arm into movement of the user support. The sliding wedge linkage between the exercise arm and user support is similar to that described in U.S. Pat. No. 6,916,278, the contents of which are incorporated herein by reference.

The main frame also has a slightly rearward inclined upright strut **235** at the rear end of base **222**, which has a stop pad **236** at its upper end forming a rest for the user support in the exercise end position of FIGS. **2** and **4**, and a pivot mounting post **238** extending upwardly from the base at a position spaced forward from upright strut **235**. The user support **224** is generally L-shaped, and has a base **240** on which a seat pad **242** is mounted, with a pair of foot rests or foot plates **244** secured adjacent the forward end of base **240**, and an upright **245** supporting back pad **246**. A guide bar or track **248** is mounted on the underside of the base **240** of the user support so as to extend at an upwardly inclined angle from the rear end to the forward end, as best illustrated in FIGS. **3** and **4**. The user support is pivoted to the pivot mount **238** via a pivot **250** located beneath the seat pad **242**.

The linear slide or wedge **230** has a lower sleeve portion which is slidably engaged on a pair of parallel, linear guide bars **251** on the base **228** of the frame, and an upper wedge shaped portion comprising spaced parallel plates with a wheel **252** rotatably mounted between the plates at its upper end for rolling engagement on the guide bar or track **248** on the underside of the user support base. The central portion **254** of the U-shaped exercise arm is rigidly mounted on the slide or wedge **230**. Rearward linear motion of the exercise arm is translated into rearward rotational movement of the user support with this arrangement.

FIGS. **3** and **4** illustrate a user **70** performing a rowing type of exercise, also known as a mid row exercise, on the machine **220**. In FIGS. **3** and **4**, dotted line **255** is the gravitational centerline of the user support pivot **250**, while dotted line **256** represents the orientation of the user support back rest, or the back of the user when seated on the support. To perform the exercise, the user sits on the seat with the user support in the position illustrated in FIG. **3**, and places their feet on the foot support plates **244** while gripping handles **226** with their arms straight out in front. The user support is initially positioned in a back supported, forwardly inclined position, so that the user's body is initially at a forward lean of around 13 degrees off vertical. The user's arms extend straight forwards with their hands slightly below shoulder level, which is similar to the starting position for a free rowing exercise.

The user then pulls handles **226** towards their body in a rowing action, simultaneously pulling the slide or wedge **230** along the rails **251**. This wedges the wheel **252** along the angled user support guide bar **248**, rotating the user support rearward about pivot **250**, and moving the user from a slightly forwardly inclined position to a reclined position, ending with their arms pulled back and their hands at a slightly lower elevation, relative to their shoulders, than the starting position, as seen in FIG. **4**. This follows a natural rearward arcing rowing motion. The end position of the user in FIG. **4** is similar to the end position for a free rowing. This exercise machine mimics the slight, naturally arcing movement of the upper body when rowing a boat or exercising on a rowing

machine, without allowing the user to bend at the waist, which is undesirable and can occur with a free rowing exercise.

In the exercise machine of this embodiment, the user support pivot **250** is positioned directly under the exerciser. The gravitational centerline **255** runs very close to the centerline of the user's hip, allowing a balanced portion of the user and user support to be positioned on each side of the gravitational centerline in both the start and finish position. Because the user support seat **242** rises upward as it rotates and the exercise arm travels in a straight line, the positioning of the exerciser's hands, relative to their shoulders, is slightly higher in the starting position than the finish position. This involves more of the back muscles and combines multiple lat pull movements in one exercise, which is not possible with a conventional rowing machine exercise using a cable.

FIGS. **5** and **6** illustrate a modified rowing or mid-row exercise machine **300** according to another embodiment, in which the exercise arm and connecting linkage are different from the previous embodiment but the user support moves in a similar manner from a slight forward inclination in the start position to a rearward inclination in the end position. Some parts of the machine in FIGS. **5** and **6** are identical to parts in the previous embodiment, and like reference numbers are used for like parts as appropriate.

As in the previous embodiment, a generally L-shaped user support frame **224** is pivotally mounted on main frame **222** via a pivot at the upper end of pivot mount **238** so as to rotate about pivot axis **250**. Unlike the previous embodiment, a user engagement device or exercise arm **302**, which may comprise separate arms on each side of the main frame, or a U-shaped exercise arm as in the previous embodiment, is pivoted to the base **228** of the main frame for rotation about pivot axis **304**. The user engageable exercise arm **302** has hand grips **305** at its upper ends.

The connecting linkage **306** in this embodiment is a multiple part linkage which includes a sliding link or carriage **307** which is slidably engaged on the base of the main frame, and pivoted links **314**, **315** extending between the carriage and the exercise arm, and between the carriage and the user support frame, respectively. The sliding link or carriage **307** has a sleeve **308** slidably engaging a pair of parallel rails or guide bars **310** on the base of the frame, which are similar to the guide rails **251** of the previous embodiment but do not extend as far back as the rails **251** due to the reduced distance of sliding movement required in this embodiment. The carriage **307** further comprises a connecting plate or plates **312** mounted on top of sliding sleeve **308**. The first pivoted link **314** is pivoted to plate **312** at one end and to the exercise arm **302** at the opposite end, and a second pivoted link **315** is pivoted to the plate at one end and pivoted to the base **240** of the user support frame at the opposite end. The pivot connections of the two links **314** and **315** to sliding link connecting plate **312** are spaced from one another. The connecting plate **312** is also connected to the load in weight stack **232** via cable **316** which extends from a rear end of connecting plate **312**, round a pulley **318** on the base of the frame, and then forward to the weight stack housing where it is linked in a conventional manner to a selected number of the weights in the weight stack housing.

The user **70** starts the exercise in a position similar to the start position of the previous embodiment, as illustrated in FIG. **5**, with the seat pad **242** at a slight downward inclination, the back pad **246** inclined forward at an angle of around 13 degrees, and the user's arms extending forward and gripping the handles **305** at the upper ends of exercise arms **302**, which also start in a forwardly pivoted orientation but at a greater angle of inclination than the back pad or back rest **246**. In this position, the two pivoted links **314**, **315** are both pivoted downwards and almost parallel to one another, while the sliding link **308** is at the forward end of the rails **310**.

In order to perform a rowing exercise, the user pulls handles **305** towards their body in a rowing action, simultaneously rotating exercise arms **302** rearward about the pivot **304**. Rearward rotation of arms **302** pulls pivoted link **314** rearward and upward at its end which is secured to the exercise arm, and simultaneously pulls the sliding carriage rearward along rail **310**. Movement of the carriage also moves the lower end of pivoted link **315** rearward, simultaneously rotating the link **315** forward and upward at its upper end which is secured to the base of the user support. This tilts the user support upward at its forward end, moving the user and user support from a slightly forwardly inclined position to a reclined position. The user ends the exercise with their arms pulled back and their hands at a slightly lower elevation relative to their shoulders than the starting position, as seen in FIG. **6**. This follows a natural rearward arcing rowing motion. The end position of the user in FIG. **6** is similar or identical to the end position of FIG. **4** of the previous embodiment, with the back rest tilted rearward from the vertical at an angle of around 10 degrees. Again, this exercise machine mimics the slight, naturally arcing movement of the upper body when rowing a boat or exercising on a rowing machine, without allowing the user to bend at the waist, which is undesirable and can occur with a free rowing exercise.

In the exercise machine of this embodiment, as in the previous embodiment, the user support pivot **250** is positioned directly under the exerciser. The gravitational centerline **255** runs very close to the centerline of the user's hip, allowing a balanced portion of the user and user support to be positioned on each side of the gravitational centerline in both the start and finish position. Because the user support seat **242** rises upward as it rotates and the exercise arm rotates about a pivot axis at its lower end, the positioning of the exerciser's hands, relative to their shoulders, is slightly higher in the starting position than the finish position. This involves more of the back muscles and combines multiple lat pull movements in one exercise, which is not possible with a conventional rowing machine exercise using a cable.

FIGS. **7** to **9** illustrate a rowing or mid-row exercise machine **350** according to a third embodiment, comprising a main frame having a base **352**, a user support frame **354** pivotally mounted on the main frame base **352** via a four bar pivot system **355**, and a user engagement device or exercise arm **356** pivotally mounted on the main frame base **352** for rotation about pivot axis **358**. Movement of the user engagement device **356** is translated into movement of the user support via a connecting linkage which in this case comprises a connecting link **360** pivoted between the user engagement device or exercise arm **356** and one of the links of the four bar pivot system **354**, as explained in more detail below. User engagement device or exercise arm **356** is linked to a user selected amount of weight in a weight stack (not illustrated) in weight stack housing **362** at the forward end of the main frame, via a load bearing cable **364** extending from arm **356** between dual pulleys **365** at the base of the frame and then forward to the weight stack.

The user support frame **354** is similar to the previous embodiments except that the base **366** does not extend as far forward from seat pad **368** and has no foot plate or plates secured at its forward end. Instead, footrests **370** which support the user's feet are mounted on the upper end of a vertical post **371** on the base **352** of the main frame in front of the user support, and remain stationary throughout the exercise move-

ment. As in the previous embodiments, the user support frame has a rear portion **372** which extends generally upwardly from the base, and on which a back rest or back pad **374** is mounted to support the user's back.

The four bar pivot system **355** which pivotally mounts the user support frame on the base of the main frame has first and second spaced bars or pivot links **375**, **380** each pivoted between the base **352** of the main frame and the base **366** of the user support. The first bar or pivot link **375** is pivoted at one end to the base **352** for rotation about first pivot axis **376** and at the other end to the underside of the base **366** of the user support for rotation about second pivot axis **378**. A second bar or pivot link **380** is pivoted at one end to the base **352** of the main frame at a location spaced forward of pivot axis **378**, for rotation about third pivot axis **382**. The upper end of pivot link **380** is pivoted to the underside of the user support base for rotation about fourth pivot axis **384** which is spaced forward from the second pivot axis **378**.

The connecting link **360** is pivoted at its forward end to the exercise arm **356**, for rotation about pivot axis **385** which is close to the lower end of arm **356**, and is pivoted at its rear end to the first or rear pivot link **375** of the four bar pivot system, for rotation about pivot axis **386**. A first end stop at the upper end of post **388** on the main frame engages the exercise arm **356** in the start position of an exercise, as seen in FIG. **7**. A second end stop at the end of post **390** at the rear end of the main frame base **352** engages the rear pivot link **375** of the four bar user support pivot system in the end position of an exercise, as seen in FIG. **8**.

The user engagement device **356** may comprise separate, independently movable exercise arms or a U-shaped exercise arm as in the first embodiment which is pivoted to the main frame at the base of the U-shape for rotation about pivot axis **358**. Handles or grips **391** are provided at the upper end of each exercise arm or upright exercise arm portion.

As noted above, FIG. **7** illustrates a user seated on the machine **350** in the start position for a mid-row exercise, while FIG. **8** illustrates the user and machine in the end position of the exercise. In order to perform a mid-row exercise, the user sits on user support seat **368** with their back against back pad **374**, and reaches forward to grab the handles **391** of the user engagement device or exercise arms **356**. This is the position illustrated in FIG. **7**. The user then pulls the handles **391** inward towards their chest, stopping when the handles reach the end position of FIG. **8**, just in front of their chest and slightly below shoulder level.

In moving from the start position of FIG. **7** to the end position of FIG. **8**, the seat pad **364** and back pad **374** of the user support move from the rearwardly reclined position illustrated in FIG. **7**, pivoting forwardly via the four-bar pivot linkage to a less rearwardly reclined position as illustrated in FIG. **8**. The four-bar pivot linkage defines a theoretical pivot of the pivoting movement, as illustrated in FIG. **9**. In FIG. **9**, the start and end positions of the exercise movement are superimposed in order to illustrate the theoretical pivot location **392** and how different parts of the machine are oriented in the finish position relative to the start position. The parts which move are designated with an A in the start position and a B in the finish position. The two pivots **376** and **382** of the links **375** and **380** to the main frame are fixed, while the pivots **378** and **384** travel from positions **378**A and **384**A to positions **378**B and **384**B, respectively. FIG. **9** illustrates the plotting of the theoretical pivot point **392** for the user support. The theoretical pivot point **392** is at the point of intersection of the centerlines C, D of the arcing movement for each link **375**, **380** of the user support four-bar pivot system. From this point we can determine the gravitational centerline **90** of the pivoting movement, which is shown as a dotted vertical line. The first centerline C extends from pivot **376** through the center of a line connecting the start and end position **378**A, **378**B of pivot **378**, and the second centerline D extends from fixed pivot **382** through the center of a line connecting the start and end positions **384**A, **384**B of pivot **384**. It can be seen from this drawing that it would be difficult and more expensive to duplicate the pivoting movement of the user support provided by four-bar pivot linkage **355** with a single pivot mount, since this would require an actual pivot at point **392**.

During the exercise motion, the angle of the user support seat **368** goes from more rearwardly reclined to less rearwardly reclined, because movement in the four-bar pivot system dips the front end of the user support seat **368** as it raises the rear end. It also shifts the pad rearward slightly (compare pad positions **368**A and **368**B in FIG. **9**). This combined action moves slightly more of the user onto the resistance side of the gravitational centerline, since the user's body is rotated slightly forward.

In the exercise machine of this embodiment, the theoretical pivot axis **392** of the pivotal movement is just forward of the user's hip, while the four-bar pivot system **355** is positioned under the exerciser. The gravitational centerline **90** of the pivotal movement runs forward of the centerline of the user's hip, and a balanced portion of the user and user support is positioned on each side of the gravitational centerline in both the start and end position. In this embodiment, the positioning of the exerciser's hands relative to their shoulders is slightly higher in the starting position than the finish position. This involves more of the back muscles and combines multiple lat pull movements in one exercise, which is not possible with a conventional rowing machine exercise using a cable.

FIGS. **10** to **12** illustrate a rowing or mid-row exercise machine **10** according to another embodiment with a user **70** positioned on the machine to perform a mid-row exercise, while FIGS. **13**A and **13**B illustrate one of the articulating handles **15** of the user engagement device **16** of this machine. Machine **10** has a main frame **12**, a user support frame **18** pivotally mounted on the main frame, a user engagement device **16** having independent exercise arms **22**, **24**, and an exercise resistance comprising a weight stack in housing **25** linked to the user support frame **18** via cable and pulley assembly **26**, only part of which is visible in the drawings. The user engagement device **16** is linked to the user support frame by a connecting linkage **28** so that pulling on the handles **15** in a rowing exercise is translated into movement of the user support frame, as described in more detail below.

Main frame **12** has a horizontal base **20**, an upwardly extending portion **30** with a generally horizontal section **32** at its upper end, and a pair of pivot mounting plates **34** extending upwardly from the frame adjacent its rear end. The user support frame **18** has a base **35** with a user support seat or pad **36** at its rear end and a downwardly extending forward end portion **37** having a foot plate or plates **38** secured at its lower end. An upright member **39** extends upwardly from the base **35** at a location in front of the user support seat **36**, and has a rearwardly curved upper portion with a chest pad **40** mounted at its end for engaging the chest of a user **70** during the exercise. The pivot mounting plates support pulleys (not visible) of the load engaging cable and pulley assembly **26** which is located beneath the user support seat **36**, and are pivotally connected to the base **35** of the user support frame at a location spaced forward from the seat and under post **39**, to allow rotation of the user support frame about pivot axis **42**.

The user engagement device **16** in this embodiment is partly rigid and partly flexible, and comprises right and left rigid exercise arms or arm portions **22**, **24** (see FIG. **12**) each

having an articulated handle **15** secured at one end for engagement by a user's hands, and a flexible elongate member such as a cable **44** which runs around a series of pulleys and extends between arms **22**, **24**. The cable **44** has a first end anchored to the end of arm **22** and runs around a first outwardly angled pulley **45** on the upwardly extending portion **30** of the main frame, around a pulley **46** on the upper horizontal section **32** of portion **30**, and then downwardly around a floating pulley **48**. The cable **44** then runs upwardly around a fixed pulley **49** (see FIG. **12**) mounted on upper horizontal section **32** of the main frame behind pulley **46**, then back down and around a second outwardly angled pulley **50** on the upwardly extending portion **30** of the main frame (see FIG. **12**) before anchoring to the end of arm **24**. Each of the rigid exercise arms **22**, **24** extends through a respective guide tube **52**, only one of which is visible in FIGS. **10** and **11**. Guide tubes **52** are supported on the upright portion **30** of the main frame by angled support struts **54**, and are each angled in alignment with the respective outwardly angled pulley **45**, **50** to define diverging linear paths for the two arms **22**, **24**, as best seen in FIG. **12**. The exercise arms diverge from one another at an angle of around 14 degrees in this embodiment, as shown in FIG. **12**.

The connecting linkage **28** comprises a cable and pulley assembly having a cable **55** extending from the housing of floating pulley **48** around a first pulley **56** mounted on the base **20** of the main frame adjacent the weight stack housing and a second pulley **58** mounted on the base **20** at a location spaced from the first pulley and beneath the user support frame. Cable **55** is then anchored to a cable anchor **60** on the lower side of the user support base **35**, at a location on the downwardly extending, forward end portion of base **35**. Thus, in this embodiment, the connecting linkage comprises a flexible link extending from the user engagement device around pulleys on the main frame before connecting to a forward end portion of the base of the user support frame.

The articulating handles **15** allow the user to change their hand position as needed throughout the exercise. As best illustrated in FIGS. **13**A and **13**B, each handle **15** comprises a generally C-shaped bracket **62** pivotally connected at its center to the end of the respective exercise arm **22**, **24** for rotation about a first pivot axis **64** aligned with the longitudinal axis of the respective exercise arm. A hand grip **65** is pivotally mounted between the ends of the C-bracket **62** for rotation about its axis **66**. These handles allow for multiple grip positions as indicated by the arrows and dotted line positions in FIG. **13**A, and permit the user to self-align their wrist to the movement pattern.

In order to perform the exercise, the user **70** first sits on the user support pad **36** in the position of FIG. **10** and the solid line position of FIG. **12**, placing their feet on the footplate **38** and their chest against the chest pad **40**, then grabs the grips **65** of handles **15** with their arms straight in front of their body, slightly bent, and their hands relatively close together, as indicated in solid lines in FIG. **12**. At the start of the exercise, the user is in a slightly reclined orientation at an angle of around 6 degrees to the gravitational centerline **80** extending through user support pivot **42**, as indicated in FIG. **10**, where the second dotted line **82** indicates the orientation of the chest pad **40** or front of the user's chest at the start of the exercise.

From the position illustrated in FIG. **10**, the user pulls the handles or hand grips **15** rearward towards their chest, so that the exercise arms **22**, **24** travel rearward and outward on divergent linear paths, as indicated by the dotted line end position in FIG. **12**. Rearward movement of the exercise arms pulls the ends of cable **44**, lifting the floating pulley **48** and also pulling the connecting linkage cable **55** to rotate the user support downwardly at its forward end and upwardly at its rear end against the exercise resistance, with the chest pad and user upper body ending up in a forward lean of around 20 degrees from the vertical, as seen in FIG. **11**. The user support seat pad **36** is inclined downward in the end position of the exercise. The user's arms finish in a bent position with their hands positioned adjacent opposite sides of their chest, slightly below and forward of their shoulders. The user's hands therefore diverge during the exercise movement, starting at a spacing of about 12 inches and ending at a wider spacing of around 13 inches in the illustrated embodiment.

The user is in three different positions throughout the exercise, starting in a recline or decline position, traveling through a straight, upright position, and ending in a forward incline position. At the same time, there is a change in elevation of the user's shoulders between the start and finish position, which amounts to about a four inch change. These factors together provide an enhanced workout by involving a greater number of muscles than a mid-row exercise performed in only one position.

The gravitational centerline or vertical centerline **80** of the user support pivot runs through the exerciser's thigh, just behind the knee in the start position and ending at mid thigh in the end position of the mid-row exercise. There is a balanced distribution of weight on each side of the centerline **80** of the pivotal movement both at the start and end position, minimizing the effect that the weight of the exerciser and user support has on the exercise resistance. The amount of weight positioned on each side of centerline **80** varies only slightly from the start to the finish position. The combined weight of the user and user support has little effect on the amount of starting resistance because a substantially equal amount of weight is balanced rearward of the user support pivot. By the same token, because only a small portion of the user passes through the gravitational centerline during the exercise, there is no appreciable drop-off in resistance felt by the user.

In each of the above embodiments, the connecting linkage translates movement of the user engagement device to the user support. The connecting linkage may be movably engaged with at least two of the main frame, user engagement device, and user support. In some embodiments, such as the embodiments of FIGS. **5** and **6** and **10** to **12**, the connecting linkage is associated with all three of the user engagement device, user support, and main frame. The connecting linkage may have multiple parts or comprise a single rigid link, articulated links, completely flexible links, a sliding wedge link or rolling carriage, and the like, and the connecting linkage may be made adjustable.

The user engagement device may have linked or separate exercise arms moveable in straight, parallel paths or in slightly diverging straight paths during an exercise, or may be a pivotally mounted exercise arm. The exercise arm or arms may be movably mounted on the main frame, connecting linkage, or user support frame, and may be rigid or partially flexible. The handles may be rigid or flexible, and may provide for two-dimensional or three-dimensional hand movement.

In each of the above embodiments, movement of the user support is linked to movement of the exercise arm or user engagement device, and the gravitational centerline of the user support's pivotal movement is positioned so that the combined weight of the user support and user is distributed on both sides of the gravitational centerline in at least one of the exercise start and end positions. Because of this arrangement, the user support provides a counter-balancing effect on the exercise arm as it moves and its weight is re-distributed. This balanced weight distribution positions a portion of the user

and user support on each side of the gravitational centerline in either the start or end position, or both the start and end position. As the exercise arm is moved, a portion of this combined weight passes through the gravitational centerline redistributing the weight. This re-distribution is gradual and continuous throughout the exercise motion and is not noticed by the user.

In the exercise machines described above, operation of the user engagement device causes a rocking movement of the user support. Due to the position of the user support pivot or the theoretical pivot, the movement of the user and user support has only a small effect on the exercise resistance felt by the user, and there is no high resistance to be overcome in starting the exercise, or large resistance drop-off. The rocking movement of the user support recruits core stabilizing muscles and also makes the exercise enjoyable to perform. Repetitious exercise movement can be tedious and boring. By adding motion to the user support, without any large increase or change in resistance felt during the exercise, performing the exercise is more enjoyable and the user's interest in their workout increases. This is a benefit both to the individual exerciser, who may be motivated to exercise more regularly, and the fitness facility, where retention of members is a primary objective.

It should be understood that all the different elements used in the various embodiments may be mixed and interchanged with one another, and different types and forms of components could be used without affecting the scope of the invention. Cables could be replaced with belts, ropes, chains, or the like, and pulleys could be replaced with sprockets. The seat and/or back pad could be fixed or made adjustable. Various different types of user engaging pads can be used. The exercise arm or user engagement device could be unidirectional or bi-directional, and may be in one piece (dependent) or two pieces for independent arm movement. The exercise arm may be mounted on the user support, main frame, or connecting linkage, and the exercise arm movement may be rotational or linear.

The user support and user engagement device could be designed to travel in the same or opposite directions. The user support pivot mount may have a single pivot or multiple pivots, and in the latter case the user support pivots about a theoretical pivot mount of the combined pivotal motion. Any of the various embodiments could have the resistance associated with any of the moving parts (user support, user engagement device, or connecting linkage). The exercise resistance may be a weight stack linked to part of the apparatus by a cable and pulley arrangement, or may be weight plates. Any other type of resistance known in the art may alternatively be used, such as hydraulic, pneumatic, electromagnetic, or elastic bands, in place of the weight stack or weight plates.

Although the exercise machine described above is a single, stand-alone exercise station, it may be incorporated as one of the exercise stations in a multi-station exercise machine. The multiple user supports provide secure and safe positioning, placing the user in the proper exercise alignment from start to finish, without any adjustment required by the user. The seat and upper body support (chest pad or back pad) travel together in fixed alignment to keep the user in the same position throughout the exercise motion so that the user does not have to worry about balancing on a moving platform or pad. Additional supports or foot plates which also travel with the user support provide a rest for the user's feet during travel of the user support, for added stability.

In each case, the user support is positioned relatively low to the ground in the start and end position, making the machines quicker, easier, and safer to enter and exit. The user does not have to climb up or down in order to get into, or out of, the exercise position. The low profile also makes the machines more economical to produce and less intimidating to the user. The user's position is continuously adjusted throughout the exercise from a slight rearward lean, through an upright position, and ending in a forward lean. This results in involvement of more back muscles than would be involved in a corresponding pulling exercise where the exerciser remained in the same position throughout the exercise. The combined exercise arm and user support movement produces an automatic and continuous self-aligning exercise motion that allows enhanced hand and wrist positioning versus free weight and free bar exercises or prior art machines for performing equivalents of such exercises.

The user support has both a primary user support and a secondary user support which travel together during the exercise movement, and also has an additional user support in the form of a foot plate or foot rests to provide additional stabilization. This helps to maintain a proper exercise position throughout the exercise so that the user feels secure on the moving user support.

The above description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the invention. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles described herein can be applied to other embodiments without departing from the spirit or scope of the invention. Thus, it is to be understood that the description and drawings presented herein represent a presently preferred embodiment of the invention and are therefore representative of the subject matter which is broadly contemplated by the present invention. It is further understood that the scope of the present invention fully encompasses other embodiments that may become obvious to those skilled in the art and that the scope of the present invention is accordingly limited by nothing other than the appended claims.

The invention claimed is:

1. A mid-row exercise machine, comprising:

a floor-engaging main frame having a forward end and a rear end;

a user support frame pivotally associated with the main frame and movable between a start position and an end position during an exercise, the user support frame moving about a user support pivot axis in one direction between an exercise start position and an exercise end position during an exercise movement;

the user support frame having at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the primary support supporting the majority of a user's weight in the start position of the support frame, and the secondary support being secured at a fixed angular orientation relative to the primary support and not moving relative to the primary support as the user support frame travels between the exercise start and end positions during the exercise movement;

a user engagement device movably mounted relative to the frames and having at least one hand grip for gripping by a user positioned on the user support, the user engagement device being movable in a mid-row, pulling exercise movement path between a start position in which the hand grip is at a first position spaced in front of at least one of the primary and secondary supports, and an end position spaced rearwardly from the first position closer to said at least one support;

a connecting linkage which translates pulling movement of the user engagement device to movement of the user support frame; and

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage;

whereby the combined motion of the user, user support, and user engagement device substantially replicates the natural movement of the upper part of a human body when performing a rowing exercise.

2. The machine of claim **1**, wherein the user support frame supports a user in a seated position, the primary support comprises a seat pad and the secondary support comprises an upper body engaging pad.

3. The machine of claim **2**, wherein the secondary support comprises a back pad.

4. The machine of claim **2**, wherein the secondary support comprises a chest pad.

5. The machine of claim **2**, wherein the user support frame further comprises an additional support which supports a different part of a user's body from the seat pad and upper body enaging pad.

6. The machine of claim **5**, wherein the additional support comprises a foot support for the user's feet.

7. The machine of claim **6**, wherein the foot support is rigidly secured to the user support frame at a predetermined, fixed orientation relative to the primary and secondary supports and not moving relative to the primary and secondary support as the user support frame travels between the start and end positions throughout an exercise.

8. The machine of claim **6**, wherein the foot support is rigidly secured to the main frame in front of the user support frame and at a predetermined, fixed orientation relative to the main frame.

9. The machine of claim **1**, further comprising a single pivot connection pivotally connecting the user support frame to the main frame and located beneath the user support frame.

10. The machine of claim **1**, further comprising a four-bar pivot system pivotally connecting the user support frame to the main frame.

11. The machine of claim **1**, wherein the user engagement device is movable in a linear path relative to the frames.

12. A mid-row exercise machine, comprising:

a floor-engaging main frame having a forward end and a rear end;

a user support frame pivotally associated with the main frame and movable between a start position and an end position during an exercise;

the user support frame having at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the secondary support being fixed at a predetermined angular orientation relative to the primary support, the primary support supporting the majority of a user's weight in the start position of the support frame;

a user engagement device movably mounted relative to the frames and having at least one hand grip for gripping by a user positioned on the user support, the user engagement device being movable in a mid-row exercise movement path between a start position in which the hand grip is at a first position spaced in front of the chest of a user positioned on the user support, and an end position spaced rearwardly from the first position closer to the user's chest;

a connecting linkage which translates movement of the user engagement device to movement of the user support frame;

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage;

whereby the combined motion of the user, user support, and user engagement device substantially replicates the natural movement of the upper part of a human body when performing a rowing exercise;

the user engagement device being movable in a linear path relative to the frames and comprising a pair of exercise arms slidably moveable relative to the main frame in diverging linear paths between the start and end positions, each arm having a hand grip for gripping by the user and the hand grips being closer together in the start position than the end position of an exercise.

13. The machine of claim **1**, wherein the connecting linkage comprises a moving carriage member slidably engaged with the main frame and associated with user support frame.

14. The machine of claim **13**, wherein the moving carriage member is slidably engaged with both the main frame and the user support frame.

15. The machine of claim **13**, wherein the connecting linkage further comprises a link member pivotally linking the sliding carriage with the user support frame.

16. The machine of claim **13**, wherein the user engagement device is secured to the moving carriage member and is slidable with the carriage member relative to the frames.

17. The machine of claim **13**, wherein the user engagement device is pivotally mounted on the main frame and linked to the moving carriage member.

18. The machine of claim **1**, wherein the user engagement device comprises first and second hand grips and first and second arm portions extending from the respective hand grips and associated with at least one of the main frame, user support frame, and connecting linkage, each arm portion being non-rigid along at least part of the length of the arm portion.

19. The machine of claim **18**, wherein each arm portion has a first, rigid part extending from the respective hand grip, and an elongate flexible part extending from the rigid part to the connecting linkage.

20. A mid-row exercise machine, comprising:

a floor-engaging main frame having a forward end and a rear end;

a user support frame pivotally associated with the main frame and movable between a start position and an end position during an exercise;

the user support frame having at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the secondary support being fixed at a predetermined angular orientation relative to the primary support, the primary support supporting the majority of a user's weight in the start position of the support frame:

a user engagement device movably mounted relative to the frames and having at least one hand grip for gripping by a user positioned on the user support, the user engagement device being movable in a mid-row exercise movement path between a start position in which the hand grip is at a first position spaced in front of the chest of a user positioned on the user support, and an end position spaced rearwardly from the first position closer to the user's chest;

a connecting linkage which translates movement of the user engagement device to movement of the user support frame;

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage;

whereby the combined motion of the user, user support, and user engagement device substantially replicates the natural movement of the upper part of a human body when performing a rowing exercise;

the user engagement device comprising first and second hand grips and first and second arm portions extending from the respective hand grips and associated with at least one of the main frame, user support frame, and connecting linkage, each arm portion being at least partially non-rigid;

each arm portion having a first, rigid part extending from the respective hand grip, and a flexible part extending from the rigid part to the connecting linkage; and

the flexible part comprising at least one cable extending between the rigid parts of the two arm portions and associated with the connecting linkage between the rigid arm parts.

21. The machine of claim **1**, wherein the hand grip has a first portion rotatable about a first axis and a second, gripping portion rotatable relative to the first portion about a second axis perpendicular to the first axis.

22. The machine of claim **1**, wherein the user engagement device comprises first and second rigid exercise arms rotatable relative to the frame about a common pivot axis, each exercise arm having a hand grip for gripping by a user positioned on the user support frame.

23. The machine of claim **22**, wherein the exercise arms are joined to move together in an exercise movement.

24. The machine of claim **22**, wherein the exercise arms are independently movable.

25. The machine of claim **1**, wherein the primary support comprises a seat pad, and the end position of the seat pad is at a different angular orientation relative to the start position.

26. The machine of claim **25**, wherein the seat pad is forwardly inclined in the start position and rotates rearwardly from the forwardly inclined position during an exercise.

27. The machine of claim **26**, wherein the seat pad is rearwardly reclined in the end position.

28. The machine of claim **25**, wherein the seat pad is rearwardly reclined in the start position and rotates forwardly from the rearwardly reclined start position during an exercise.

29. The machine of claim **28**, wherein the seat pad is in a less rearwardly inclined orientation in the end position than in the start position.

30. The machine of claim **28**, wherein the seat pad is forwardly inclined in the end position.

31. The machine of claim **1**, wherein the user engagement device and user support frame move in opposite directions during an exercise.

32. The machine of claim **1**, wherein the user engagement device and user support frame move in the same direction during an exercise.

33. A rowing exercise machine, comprising:

a floor-engaging main frame having a front end and a rear end;

a user support frame;

a pivot assembly pivotally mounting the user support frame relative to the main frame and adapted to define a rotation path of the user support frame about the pivot assembly between a start position and an end position of an exercise movement, the pivot assembly having at least one pivot and defining a vertical gravitational center line of the pivotal movement of the user support frame;

the user support frame adapted to support a user in an exercise position facing the front end of the main frame, the user support frame having at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the primary support supporting the majority of a user's weight in the start position of the support frame, and the secondary support being secured at a fixed angular orientation relative to the primary support and not moving relative to the primary support as the user support frame travels between the exercise start and end positions during the exercise movement;

a user engagement device movably mounted in front of at least the primary support of the user support frame for movement relative to one of the frames, the user engagement device having at least one partially rigid portion having a hand grip engaged by the user in performing rowing exercises and adapted to move in an exercise path between exercise start and end positions;

a connecting linkage which translates movement of the user engagement device to movement of the user support frame; and

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage.

34. The machine of claim **33**, wherein the gravitational center line of the user support pivotal motion is positioned such that portions of the combined weight of the user and user support frame are distributed on each side of the gravitational center line of the pivotal motion in at least one of the start and end position and only a portion of the combined weight passes through the gravitational center line during the exercise movement.

35. The machine of claim **33**, wherein the user support frame has a seat pad which supports a user in a seated position and the gravitational center line extends through the seat pad in at least one of the start and end position of an exercise movement.

36. The machine of claim **33**, wherein the user support frame has a base and a seat pad on the base which supports a user in a seated position, and the gravitational center line extends through the base of the user support frame.

37. The machine of claim **33**, wherein the user support frame has a base, the primary user support comprises a seat pad on the base which supports a user in a seated position, and the user support pivot assembly is associated with the base of the user support frame.

38. The machine of claim **37**, wherein the main frame has a base and the user support pivot assembly comprises a four bar pivot linkage between the bases of the user support frame and the main frame.

39. The machine of claim **37**, wherein the user support pivot assembly further comprises a pivot mount on the main frame and said pivot comprises a pivot connection between the pivot mount and the base of the user support frame.

40. The machine of claim **33**, wherein the user support frame further comprises an additional support spaced from the primary and secondary supports and supporting a spaced position on a user's body.

41. The machine of claim **33**, wherein the secondary support comprises a foot support for the user's feet and no part of the foot support is moveable relative to the primary support.

42. The machine of claim **33**, wherein the user engagement device has two partially rigid portions each having a hand grip engaged by the user when performing a rowing exercise.

43. A rowing exercise machine, comprising:

a floor-engaging main frame having a front end and a rear end;

a user support frame;

a pivot assembly pivotally mounting the user support frame relative to the main frame for rotation about a user support pivot axis, the pivot assembly adapted to control rotation of the user support frame along an exercise path between a start position and an end position during an exercise movement, the pivot assembly having at least one pivot and defining a vertical gravitational center line of the pivotal movement of the user support frame which extends through the user support pivot axis;

the user support frame supporting a user in a rowing exercise position facing the front end of the frame and having at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the primary support supporting the majority of a user's weight in the start position of the support frame, and the entire secondary support being secured at a fixed angular orientation relative to the primary support and no part of the secondary support moving relative to the primary support as the user support travels between the exercise start and end positions during the exercise movement;

a user engagement device movably mounted relative to the frames and having at least a first exercise arm having a hand grip engaged by the user positioned on the user support frame when performing a rowing exercise, the exercise arm having a rigid portion extending from the hand grip along at least part of the length of the arm, the user engagement device being movable in a pulling exercise movement path between a start position in which the hand grip is at a first position spaced in front of at least one of the primary and secondary supports, and an end position spaced rearwardly from the first position closer to said at least one support;

a connecting linkage associated with at least two of the main frame, user support frame, and user engagement device which is adapted to translate a pulling movement of the user engagement device to movement of the user support frame along the exercise path;

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage; and

the gravitational center line of the user support pivotal motion being positioned such that portions of the combined weight of the user and user support frame are distributed on each side of the gravitational center line of the pivotal motion in at least one of the start and end position and only a portion of the combined weight passes through the gravitational center line during the exercise movement.

44. The machine of claim 43, wherein portions of the combined weight of the user and user support frame are distributed on both sides of the gravitational center line in both the start and end position of a rowing exercise.

45. The machine of claim 43, wherein the exercise arm is rigid along its entire length.

46. The machine of claim 43, further comprising a second exercise arm having a hand grip engaged by the user and a rigid portion extending from the hand grip along at least part of the length of the second exercise arm.

47. The machine of claim 46, wherein the exercise arms are positioned on the opposite sides of the user support frame, and the hand grips move in parallel paths during an exercise movement and are at the same spacing in the start and end positions.

48. The machine of claim 46, wherein the hand grips move in divergent paths during an exercise movement and are spaced farther apart in the end position than in the start position.

49. The machine of claim 46, wherein both exercise arms are rigid along their entire length and have lower ends which are connected together and movably mounted relative to the main frame.

50. The machine of claim 46, wherein the exercise arms are pivotally mounted on the main frame.

51. A rowing exercise machine, comprising:

a floor-engaging main frame;

a user support frame;

a pivot assembly pivotally mounting the user support frame relative to the main frame which allows rotation of the user support frame between a start position and an end position, the pivot assembly having at least one pivot and defining a vertical gravitational center line of the pivotal movement of the user support frame;

the user support frame at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the secondary support being fixed at a predetermined angular orientation relative to the primary support, the primary support supporting the majority of a user's weight in the start position of the support frame;

a user engagement device movably mounted relative to the frames and having a first exercise arm having a first hand grip and a second exercise arm having a second hand grip, the first and second hand grips being engaged by the user positioned on the user support when performing a rowing exercise, each exercise arm having a rigid portion extending from the respective hand grip along at least part of the length of the arm;

a connecting linkage associated with at least two of the main frame, user support frame, and user engagement device which translates movement of the user engagement device to movement of the user support frame;

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage;

the gravitational center line of the user support pivotal motion being positioned such that portions of the combined weight of the user and user support frame are distributed on each side of the gravitational center line of the pivotal motion in at least one of the start and end position and only a portion of the combined weight passes through the gravitational center line during the exercise movement; and

the exercise arms being slidably mounted for linear motion relative to the main frame.

52. The machine of claim 46, further comprising a flexible member linking the exercise arms and associated with at least one of the main frame and connecting linkage.

53. The machine of claim 43, wherein the hand grip is at a lower elevation relative to the user support frame in the end position than in the start position of an exercise.

54. A rowing exercise machine, comprising:

a floor-engaging main frame having a front end and a rear end;

a user support frame;

a pivot assembly pivotally mounting the user support frame relative to the main frame and adapted to define a rotation path of the user support frame about the pivot

assembly between a start position and an end position of an exercise movement, the pivot assembly having at least one pivot and defining a vertical gravitational center line of the pivotal movement of the user support frame;

the user support frame adapted to support a user in an exercise position facing the front end of the main frame, the user support frame having at least a primary support and a secondary support for supporting spaced positions on a user's body throughout an exercise movement, the primary support supporting the majority of a user's weight in the start position of the support frame, and the secondary support comprising a foot support which is secured at a fixed angular orientation relative to the primary support whereby no part of the foot support is movable relative to the primary support as the user support frame travels between the exercise start and end positions during the exercise movement;

a user engagement device movably mounted relative to one of the frames, the user engagement device having at least one partially rigid portion having a hand grip engaged by the user in performing rowing exercises and adapted to move in an exercise path between exercise start and end positions;

a connecting linkage which translates movement of the user engagement device to movement of the user support frame; and

a load for resisting movement of at least one of the user support, user engagement device, and connecting linkage.

55. The machine of claim **1**, wherein the user support frame supports a user in a seated position, the primary support comprises a seat pad and the secondary support comprises a lower body engaging pad.

56. The machine of claim **55**, wherein the lower body engaging pad comprises a foot support for the user's feet.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,766,802 B2
APPLICATION NO. : 12/105833
DATED : August 3, 2010
INVENTOR(S) : Randall T. Webber et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 20, line 23, after "user support frame" insert --having--.

Signed and Sealed this

Twelfth Day of October, 2010

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

United States Court of Appeals
for the Federal Circuit

IN RE RAYMOND GIANNELLI, No. 2013-1167

CERTIFICATE OF SERVICE

I, Robyn Cocho, being duly sworn according to law and being over the age of 18, upon my oath depose and say that:

Counsel Press was retained by NOVAK, DRUCE, CONNOLLY, BOVE & QUIGG LLP, Attorneys for Appellant to print this document. I am an employee of Counsel Press.

On **July 5, 2013**, Counsel for Appellant has authorized me to electronically file the foregoing **Joint Appendix** with the Clerk of Court using the CM/ECF System, which will serve via e-mail notice of such filing to any of the following counsel registered as CM/ECF users:

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Upon acceptance by the Court of the e-filed document, six paper copies will filed with the Court, via Federal Express, within the time provided in the Court's rules.

July 5, 2013

/s/Robyn Cocho
Counsel Press